CISCO'S VPN CHALLENGE Cisco airs new VPN products but is missing key management tools. **Page 10.**

SON OF CABLETRON Spinoff Enterasys Networks, led by Henry Fiallo, makes its debut. **Page 21.**

The leader in network knowledge

NetworkWorld

April 10, 2000 Volume 17, Number 15

The network portal: www.nwfusion.com

Surviving the stock SHAKE-UP

Net infrastructure firms expected to stay strong.

Page 10.

Working the wireless Web

BY JOHN COX

At a construction site outside Chicago, a cement truck's diesel engine belches black smoke and whines high, sending the vehicle's sloping, red and white cylinder into a fast spin.

The driver stabs a dusty finger at the rugged Palm IIIx handheld mounted inside the truck's cab. The button he pushes sends, via a Cellular Digital Packet Data (CDPD) link, a "starting to pour" message to a database at a third-party Web site.

See **Wireless Web,** Page 90.

Ozinga Chicago RMC truck drivers such as Bob Iwema are using Palm handhelds to gain wireless access to data on the company's private Web.

ALAN KLEHR/MPG

Voice over DSL talk of the town

Converged services could slash voice, 'Net access costs.

BY TIM GREENE

SAN JOSE — If demonstrations from last week's DSLCon show are carried over into the real world, corporate customers will be able to turn common phone lines into high-speed voice-data circuits with ease by year-end.

Forthcoming voice-over-digital subscriber line (DSL) services will be able to replace the multiple individual phone lines and T-1 circuits that branch offices use today to carry voice calls, experts say. And broadband Internet access can ride the phone line at the same time.

Vendors, such as Jetstream Communications, are planning products that enable advanced voice-over-DSL services such as call forwarding and customizable DSL services.

At the show, makers of DSL gear proved they could run up

See **DSL**, page 87

www.nwfusion.com

CALLING OUT TO DSL

Tech Update: The positives of voice over DSL.

White paper: Jetstream's case for voice over DSL.

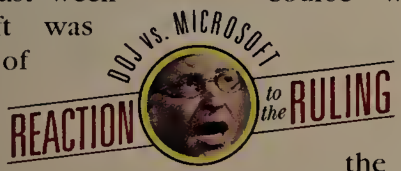
DocFinder 7639 find it online

Users assess verdict

BY JOHN FONTANA

Investors may have suffered anxiety attacks last week when Microsoft was found guilty of antitrust violations, but IT professionals who depend on the software giant's products are not panicking.

Judge Thomas Penfield Jackson's harsh ruling will likely lead to severe penalties, including a possible breakup of the company. However, IT managers say they are staying the course with Microsoft while they keep an eye on the penalty phase of the trial, which could be concluded as early as next month.



"We will not make our technology decisions based on religion or politics," says David

See **Microsoft**, page 88

AP PHOTO

New software helps enforce service levels

BY MARC SONGINI

Net professionals intent on focusing less on the conventional tasks of managing complex networks and more on monitoring the activities of specific business operations may want to look at management packages on tap from a variety of vendors.

Products from start-ups such as Centricity and Open Network Enterprise, as well as established players such as Computer Associates and Edge Technologies, will help customers more effectively uphold internal or third-party service-level agreements (SLA) and enforce quality of service

See **Management**, page 16

CACHING HARDWARE

NetworkWorld BUYER'S GUIDE Caching hardware

FEATURE: Caching appliances can save WAN bandwidth and improve Web site performance. **Page 57.**

REVIEW: Exclusive results from the industry's biggest cache bake-off: 14 vendors, 20 products, five sets of metrics. **Page 62.**

ONLINE: Interactive Buyer's Guide chart. **DocFinder: 7624**

User case study: Perkins Coie international law firm switches from software to hardware-based caching. **DocFinder: 7625**

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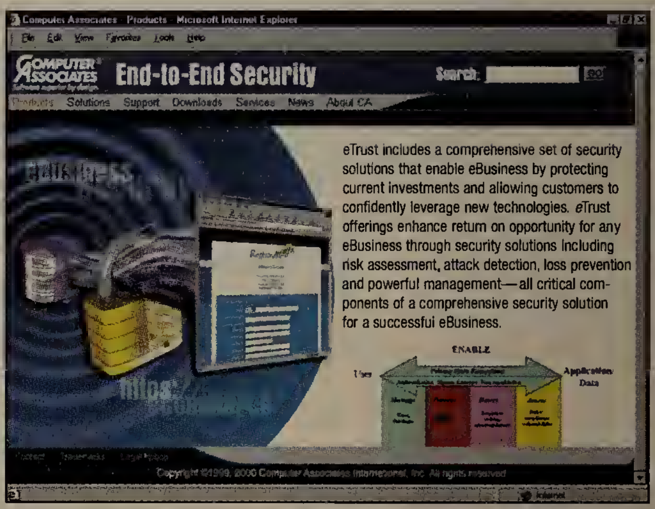
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*According to "Internet Security Software: 1999 Worldwide Markets & Trends," by IDC.

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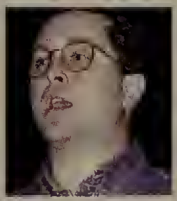

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CIRCULATION: Phone: (508) 490-6444, Fax: (508) 490-6400; E-mail: nwcirc@nww.com; **STAFF:** See the masthead on page 14 for more contact information. **REPRINTS:** (717) 399-1900

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RESEARCH

Spider Bytes: The Web's best tools and tips

Check out the privacy resources we've gathered for you (**DocFinder: 7631**):

- Not sure what to include in your company's privacy statement? Follow our link to a wizard that will help you.
- Find out what consumers are doing to dodge online marketing efforts on the "Operation Opt-out" site.
- What if sites could standardize their privacy practices? An initiative from the World Wide Web Consortium could help.

Newsletters

From the **"Storage in the Enterprise"** newsletter **(DocFinder: 7632):**

"Storage is the latest candidate for external support. Businesses are confronting an exponential growth in storage. Combine [this] with a shortage of skilled personnel and the expense associated with supporting stored data, and outsourcing storage operations becomes appealing."

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Results from our Microsoft Quickie Poll

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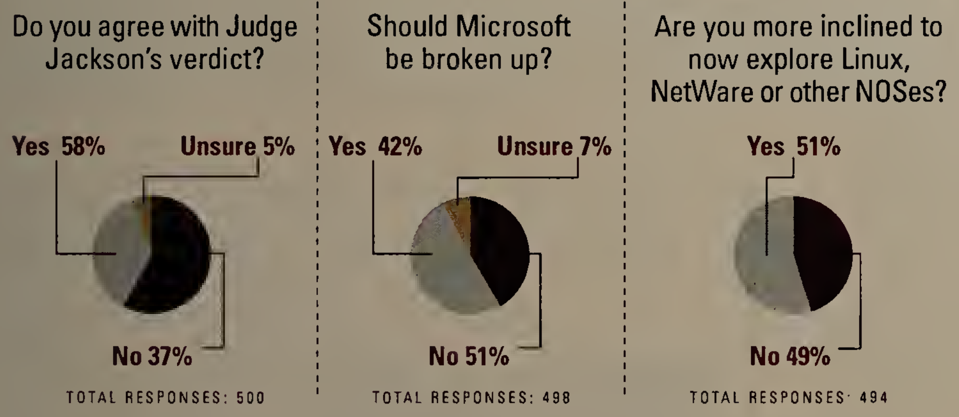


SEMINARS & EVENTS

Reality check on ASPs

Do you need help separating fact from fiction when it comes to ASPs? Sign up for the "Network World Reality Check on ASPs" seminar today. **DocFinder: 6928**

COONEY'S CORNER

The best of the NetFlash daily newsletter

Bug knocks Active Directory for a loop

Users have uncovered a bug in Windows 2000 that could prevent them from accessing Active Directory. The bug is linked to the number of IP addresses assigned to a single network interface card or multiple NICs in a Win 2000 server that is acting as a domain controller. On servers hosting more than 51 IP addresses, all objects in Active Directory will disappear. In addition, the server will return an error message saying it is not operational when administrators try to access Active Directory Users and Computers, Active Directory Domains and Trusts, and Active Directory Sites and Services. **DocFinder: 7642**

AT&T, BT, Concert make $2 billion e-commerce pledge

AT&T, British Telecommunications PLC and their joint venture Concert Communications last week said that over the next three years they will invest $2 billion to deliver e-commerce services via a worldwide network of 44 Internet data centers. The data centers, which will provide Internet services such as collocation, Web hosting and network and application services, will be in 16 countries by 2004, the companies say. **DocFinder: 7643**

Pitney Bowes launches Expedocs for document sharing

Pitney Bowes, the company known for its postage metering products, last week launched a new online document sharing service. The free Expedocs service lets users post documents online that can be shared with any number of colleagues via a Web browser or directly from a Windows application. The originator of the document can set access levels at the individual level. **DocFinder: 7644**

— Michael Cooney, associate news editor

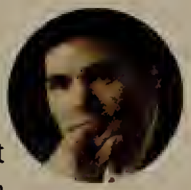
Sign up for this e-mail newsletter online. DocFinder: 3850

COLUMNISTS

Water Cooler

No more Red Hats?

Is Linux losing its luster as the open source darling for venture capitalists? News Editor Bob Brown says other open source hot spots are appearing on the horizon, including application servers and Web servers. **DocFinder: 7634**



Keeping Current

A little ditty about Microsoft's woes

If AT&T's any example, breaking up Microsoft won't keep Bill Gates & Co. from trying to continue to dominate the world, according to Fred McClimans. **DocFinder: 7635**

Help Desk

Filling the IP toolbox

Problem: A reader is moving to an all-IP network from mixed IPX/IP. He doesn't know what tools he'll need to detect problems on the multilocation network. **DocFinder: 7636**

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We've made it easy to access articles and resources online. Simply enter the four-digit DocFinder number in the search box on the home page, and you'll jump directly to the requested info.

NEWS BRIEFS, APRIL 10, 2000

Nortel thinks big on recruiting

The scramble for IT talent continues to get ever more intense . . . and creative. Nortel Networks recently hired 34 soon-to-be graduates of Santa Clara University's computer engineering school — one-third of this year's class — en masse to tackle an upcoming project as a ready-made team.

The 18 women and 16 men were among those invited — and in some cases bused — to what the students believed would be a routine recruiting event. Everyone who attended was offered a job, with salaries ranging from $53,000 to $72,000. There were reportedly tears and hugs all around as the new hires celebrated their good fortune. Nortel was pleased as punch too.

Learning the facts of post-IPO life

What goes up, must come down. That's the lesson employees at Net2000 Communications learned last week, when their stock dropped from the mid-20s to $15 per share. Net2000 is a Herndon, Va., competitive local exchange carrier (CLEC) that went public March 6.

The company's stock decline prompted Chief Financial Officer Don Clarke to issue a memo to its 600 employees educating them about the financial markets and pointing out that the entire CLEC market was suffering. "The memo said our job was to focus on building our business and that the day-to-day volatility in the market was always going to be there," Clarke says. "Everyone had the stock price up on their computer screens. There was a lot of hallway talk. We thought [the memo] was the prudent thing to do."

FBI wants 'Net war chest

According to its budget request being pondered on Capitol Hill, the Federal Bureau of Investigation wants $375 million to improve its electronic surveillance capabilities. That money includes $75 million to create a Web-based repository to let FBI agents gain access to archived audio and data reports on surveillance wiretaps and Internet targets. Acknowledging it could end up archiving massive amounts of information on people, the FBI said it intends to install special software with any new system to keep an audit trail of accessed files.

Microsoft fixes Office 2000 fix

Microsoft last week issued a hotfix for the just-released Office 2000 Service Release 1, which is the first service pack for the productivity suite. Users who installed SR-1 complained of problems with lost mail and hyperlinks in Outlook 2000. Users also had problems with search features. The SR-1 Update should be installed by users running Office 2000 on Windows 2000, 98, 95 or NT 4. Users who upgraded to 2000 from NT should not load the upgrade, as Microsoft will issue a separate hotfix for those users.

Peregrine to buy Harbinger

Peregrine Systems last week announced it intends to buy Harbinger in a stock-based acquisition valued at $2.1 billion. The companies, both involved in providing e-commerce software and services, will have a total of 44,000 customers. The merger is subject to approval by shareholders and regulatory authorities.

Sun, BroadVision to collaborate

Sun and BroadVision will collaborate on incorporating the Java 2 Enterprise Edition (J2EE) server specification into a future version of BroadVision's One-to-One Enterprise e-commerce application, which costs $500,000 or more. The fifth version of One-to-One Enterprise, which will ship this month, adds support for XML, but is not J2EE-compliant.

CTO Estrin leaving Cisco

Last week Cisco Chief Technology Officer Judith Estrin said she's calling it quits after a two-year stint with the mammoth network company. Estrin, 45, and her husband, Bill Carrico, plan to launch an Internet start-up whose exact mission is somewhat vague but will address Web scalability. Cisco picked up Estrin when it acquired her third start-up, Precept Software, a multimedia network company. Estrin was a major player in pushing Cisco into the voice-video-data convergence field. Cisco's Michelangelo Volpi, 33, will now become head of strategy, which will include CTO duties. Volpi has had a hand in 54 of the company's 55 acquisitions.

Cisco CTO Judy Estrin gets bitten by the start-up bug again.

More find filing online less taxing

According to the Internal Revenue Service, 27% of taxpayers who have managed to already file their 1999 returns have done so over the Internet. That rate already surpasses last year's online filings, which totaled 23%. This year's final tally won't be known until after the April 17 filing deadline, of course. The IRS has said it hopes to have half of all taxpayers filing online by 2008.

Dell takes aim at Internet with one-stop shopping

Follows IBM, Compaq and Hewlett-Packard.

BY APRIL JACOBS

Dell is expanding its reach in the e-commerce marketplace with broad plans to provide everything from specific-function Internet server appliances to Web start-up services.

Following the lead of other major PC and server makers, such as IBM, Compaq and Hewlett-Packard — all of which have made deep forays into the e-commerce products and services market — Dell is moving beyond its traditional mode of selling PCs, servers and workstations to tackle more global services. The new initiative includes plans for a server appliance that's preloaded with Red Hat Linux — one of the most popular on the market — as well as programs aimed at service providers and investment money for Internet-related start-ups.

Michael Dell is expanding his company's e-commerce presence.

The reason is simple: The market is ripe and ready to accept entrants.

Dan Kusnetzky, an analyst with market research firm IDC in Framingham, Mass., says users are currently shunning name-brand server makers such as Dell — No. 2 worldwide in server shipments — when buying Internet appliance servers in favor of buying cheap components and building them themselves to keep costs down.

Kusnetzky says Dell is aiming to be their choice instead. And the fact that Dell is no stranger to the e-commerce market, with $40 million in daily sales over its Web site, suggests the company is well-positioned to expand its scope.

Toward that end, Dell made several announcements last week detailing its overall e-business strategy, including:

- PowerApp appliance servers designed for specific Internet infrastructure tasks, such as Web serving, caching and load balancing.
- Service Provider Direct: Programs aimed at ISPs, application service providers and Web-hosting providers. Already signed on are Exodus, Corio and Navisite.
- "E"xpert Services: Service offerings that allow businesses to use Dell's e-consulting partnerships with Arthur Andersen and Gen3 Partners to help develop and deploy Internet strategies.
- Universal Access: An effort to enable universal Internet access through a combination of devices, connectivity offerings and access choices. The initiative includes narrow-band services, broadband offerings, and wireless products and services for homes and offices.
- Dell Ventures: This program is aimed at companies with technologies, products and services that are Internet-related. Dell Ventures will provide equity investments and services for some early-stage private companies to accelerate development. ◪

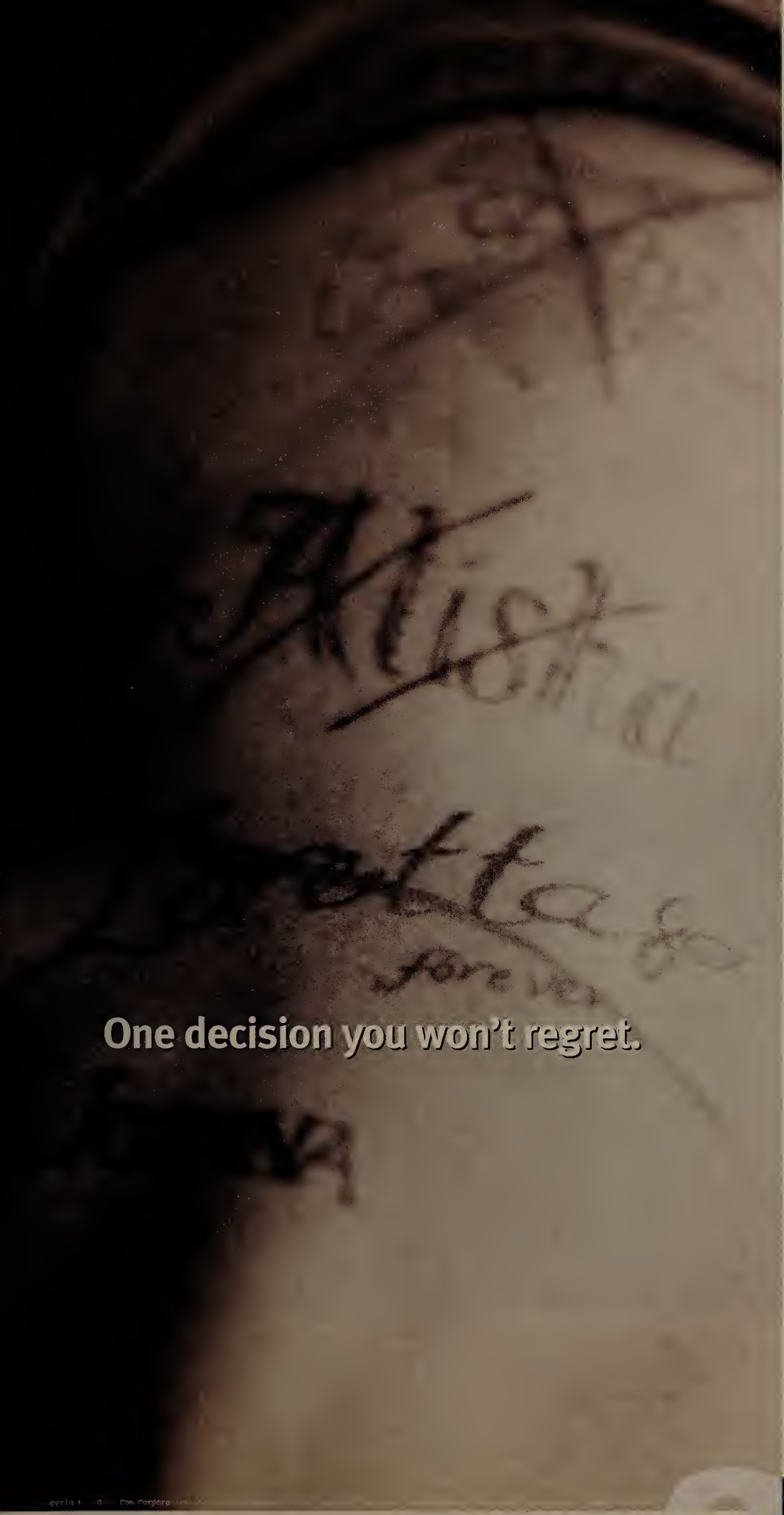
Be a

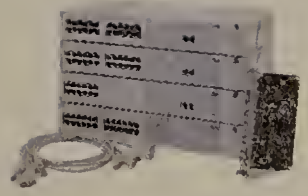
Net Know-It-All

For the answer to this week's question and more net trivia, visit **Network World Fusion** and enter **2349** in the DocFinder box.

This week's question:

Which company has announced acquisitions this year of InfoGear Technology, JetCell and SightPath?





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Another **eNetworks** solution from **3Com**®

Cisco offers low-end VPN, firewall gear

BY ELLEN MESSMER

Cisco's new enterprise VPN and firewall products

Cisco's additions, the first to include technology from its Altiga Networks acquisition last year, target small and mid-size businesses.

Product	Price	Features
Cisco VPN 3005 Concentrator	$4,000	Supports IPSec encrypted remote access for 100 users.
Cisco VPN 3000 Monitor	$5,000	Centralized multichassis monitoring via SNMP.
Cisco 1700 Series VPN module	$1,000	Hardware encryption accelerator for the Cisco 1700 router.
Cisco PIX Firewall 506	$1,950	Maximum 10 simultaneous firewall/VPN connections.
Cisco Secure Policy Manager 2.0	$7,500	Manages the PIX firewall and site-to-site IPSec VPNs.

SAN JOSE — While Cisco this week will take the wraps off a new line of low-end, low-cost remote-access VPN and firewall gear for small to mid-size businesses, the company has left users without a common way to manage it all.

The management muddle arises because Cisco's new VPN 3005 Concentrator, which supports 100 simultaneous users, has to be configured and managed using one net management monitor, while the Cisco PIX Firewall 506, a pocketbook-sized unit for supporting up to 10 users, is managed by Cisco's Secure Policy Manager 2.0.

In addition, Cisco's new hardware-based virtual private network accelerator for the Cisco 1700 router, which speeds encryption processing by off-loading the task from router software, is managed by yet another console.

The new VPN 3005 Concentrator is based on technology Cisco got when it acquired Altiga Networks, which had the VPN 3015, 3030 and 3060 more expensive and feature-rich gear. The new VPN 3005 can't be upgraded, lacks the redundancy and dual power-supply features of the older VPN 3015, and is designed for a maximum 100 simultaneous users. But the VPN 3005 costs just $4,000 — less than half the VPN 3015's $10,000 sticker price.

The lack of a common management application for Cisco's growing VPN lineup is a problem the company acknowledges, with sources there saying there are plans to bring all VPN-capable firewalls, routers and concentrators under a common management umbrella later this year using the CiscoWorks 2000 management platform.

A common management package is needed because corporations mix and match VPN-capable gear, and monitoring and configuring it from different consoles is a headache.

For example, Idexx, a supplier of animal health-analysis services and products in Westbrook, Maine, uses the older Altiga VPN concentrator and Cisco PIX firewall together.

At Idexx, the firewall sits in front of the concentrator to prefilter users and applications going in and out of the network, says Craig Darling, the company's network analyst.

Behind this firewall and in front of the corporate LAN, Idexx put the Altiga VPN Concentrator, now a Cisco product. It's there to let Idexx salespeople set up a VPN-encrypted session using the Altiga VPN client software to gain access to the intranet.

"About 400 salespeople around the globe use this for secure connections over the Internet, and it saves us a lot of money over using private lines," Darling says. But monitoring the product is a problem because it requires two separate management platforms, he adds.

"Altiga has a hell of a good Web interface for management, and Cisco is awesome for granular network configuration," Darling says. "It's two different mentalities, but if Cisco could meld the two, it would help a lot."

In a different scenario, a branch office might use the PIX Firewall 506 to set up an encrypted IP session for up to 10 users back to the Cisco VPN 3005 Concentrator at the larger home office. There's no common management application for this today, but Cisco has begun telling analysts this is on the drawing board for this year.

"Cisco does have a roadmap for this within the year," says Mark Bouchard, program director at the Meta Group consultancy's Reston, Va. office, confirming what Cisco sources told *Network World.* ◪

MORE FROM CISCO

Cisco last week announced software aimed at easing the management of campus network environments and a high-density switch that promises to save customers money on new hardware.

The firm announced CiscoWorks 2000 LAN Management Solution, a package that will give users a single browser-based view of switching and routing elements on a campus net. The suite will offer a picture of the LAN topology, as well as detect incipient problems when running key network applications, the company says.

Among other components, the LAN Management package contains the new Campus Manager suite, which handles Layer 2 device discovery and mapping. Campus Manager can detect and replicate the physical and logical connections of up to 1,000 devices, Cisco says.

The company is also introducing Content Flow Monitor, which will monitor the performance of Cisco devices handling Web server load balancing. For instance, the monitor can view a Cisco 7200 router to ensure that key 'Net business applications are being prioritized properly.

LAN Management Solution can share data with other CiscoWorks 2000 products and will be available this month. It starts at $14,995.

Cisco will also offer a high-density Ethernet switch that users could deploy as an alternative to buying multiple stacked switches. The pizza box-sized Catalyst 2980G switch will fit into campus wiring and support 80 10/100M bit/sec Ethernet ports along with two full-duplex, Gigabit Interface Converter-based Gigabit Ethernet slots, with a total throughput capacity of 24G bit/sec. The strategy behind the Catalyst 2980G is to provide all the Ethernet switching small and mid-size customers want without the need for additional modules, cables or other interconnections.

Cisco's Catalyst Mid-Market LAN Switching Solution is a family of stackable and stand-alone Layer 2 and Layer 3 switches with pricing and simplicity that Cisco hopes will appeal to companies with 250 to 1,000 employees.

— Marc Songini

Investors still keen on net ventures

But continued stock market volatility could signal an IPO slowdown.

BY CAROLYN DUFFY MARSAN

The unprecedented volatility of high-tech stocks last week sent shivers through the investment community. But Wall Street watchers say companies involved in the Internet's infrastructure — network equipment vendors and service providers — are among the best-positioned to weather these market storms.

"No matter what applications or uses of the Internet are developed successfully, the underlying infrastructure will be in continued great demand," says Robert Abbe, a principal with Broadview Associates, a firm that brokers mergers between companies.

Less certain are the fates of Web services, e-retailing and business-to-business e-commerce companies, whose strategies for building revenue have not been proven. "The business models of the network infrastructure companies are well-understood . . . and they're likely to reach profitability in a nearer term," Abbe says.

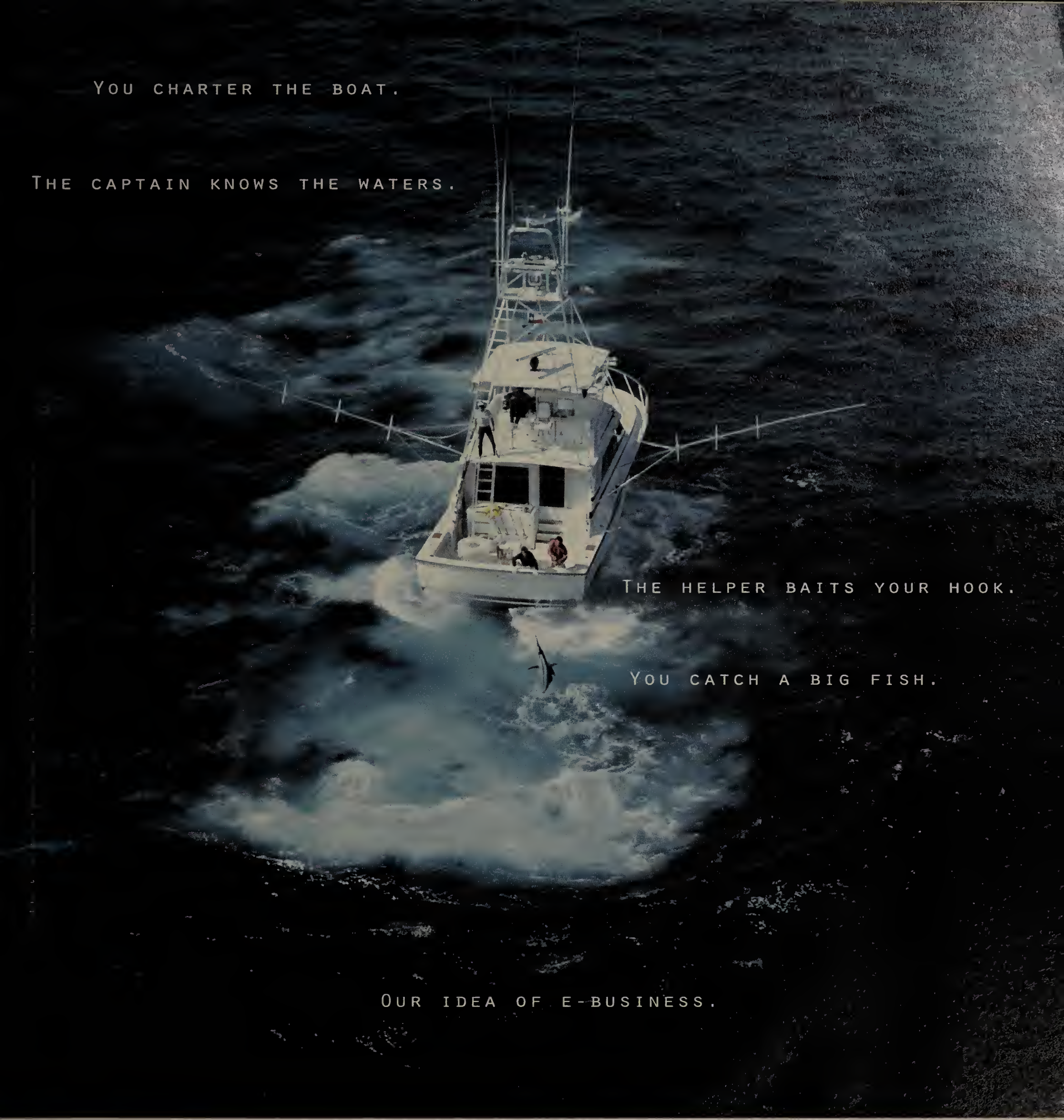
The uncertainty comes after one of the most volatile weeks in stock market history. After a significant drop last Monday, the technology-heavy Nasdaq Composite Index went crazy on Tuesday, staging one of its biggest single-day declines and biggest single-day recoveries in only a few hours. The Nasdaq dragged the Dow Jones Industrial Average along for the ride.

By midweek, the markets had calmed, but the gyrations left the financial community wondering about the long-term prospects for venture capital investments, initial public offerings (IPO) and acquisitions of Internet ventures.

Some observers say the downturn in the market valuations of Internet firms is overdue. And many heralded last week's correction as the return to more traditional investing based on revenue and profits.

"The greatest successes that investors have had in the Internet space have been in network companies. That's why

See **Stocks**, page 87



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Vendors debate where network clients are headed

BY JOHN COX

NetworkWorld
SHOWDOWN
Internet Client of the Future

William Maggs Palm **Randy Salo** Wireless Knowledge **Sunil Marangoly** Sun **Chris DiBona** VA Linux

PHOTOS: BRUCE HERSHEY

LOS ANGELES — Panelists at *Network World's* Internet Client of the Future debate last week were in "violent agreement," as one of them put it, that the center of gravity is shifting fast from Windows PCs to . . . well, something else.

The Internet World 2000 panel included representatives from Palm, Sun, VA Linux Systems and Wireless Knowledge. They outlined their visions, which focused on a range of client operating systems as well as devices of various shapes and sizes that seemed inconceivable a few years ago when the Windows PC essentially defined personal computing.

The panelists predicted the rise of "personalized computing" based on devices that let users access or receive via a browser just the Web-based data and applications they need for a particular task, at a specific time, even in a certain location. One of the chief disagreements among the panelists was whether users needed applications and data actually running on these devices, and if so, how much.

Panelists also were divided over what kinds of devices will dominate.

"People have said to us, 'the smart [Web-enabled] phone vendors will kill Palm,' " said William Maggs, newly appointed chief technology officer at Palm, the handheld device maker. "That's not going to happen. We're visual animals."

He argued the wireless Internet is of a different nature than wireless voice services. "The wireless Internet eventually will be freed from a comparison with telephony," Maggs said.

Sunil Marangoly, senior business strategy manager for Sun's SunRay thin clients, held up a credit-card sized "smart card" he uses to access all his applications and data on Sun's network. He swipes the card through a reader attached to any SunRay thin client and is free to work once the network authenticates him.

"Your whole office becomes accessible to you, no matter where you are, because you have access to information about you, your applications and your data," he said.

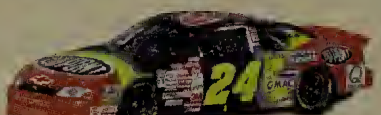
The "device independence" Marangoly discussed is important, Maggs agreed. But Maggs insisted many users will want, or need, information residing on the device.

But the panelists' rosy predictions hinge on the availability of Web-based services, pointed out audience member

See **Showdown**, page 16

Reporter's Notebook

INTERNET WORLD



Something smells funny

Next time someone says that your site stinks, the person might mean it literally. At least if your site is DigiScent-enabled. The system revolves around a computer peripheral called an iSmell Personal Scent Synthesizer. This device is packed with scent cartridges that are cracked open according to the commands sent from a Web site. So in the future you may be better off browsing 1-800 Flowers than hitting your local waste management site — if you know what I mean.

Vrrroooom!

Want to feel what it's like to drive Jeff Gordon's Winston Cup car, but unwilling to risk a cracked sternum by smacking the wall at 190 mph? Outsourcer SiteSmith lured show attendees to its booth with an unusual driving simulator. An old Gordon car had its analog dashboard replaced with a Nascar video game running on a Sega Dreamcast system. One *Network World* reporter bumped his way all the way up to 23rd place — sustaining about $20,000 in sheet metal damage in the process.

Put to the Test

And why were folks flocking around the Phobos booth? Was it to witness a demo of the ipXpress Web traffic load balancer, the IN-Switch server card or the IN-boost Secure Sockets Layer processor? Hardly. They were gathered to watch World Wrestling Federation superstar Test referee matches between audience volunteers dressed in bulky Sumo garb. In a private interview after the match, Test revealed he does not miss his ex-fiancee Stephanie McMahon, daughter of the WWF founder and owner, but prefers his new companion, a Canadian fitness model named Trish Stratus. And in Web-related news, Test indicated that the recently paralyzed wrestler Droz will soon begin writing for the hugely popular WWF Web site with the help of a new computer equipped with speech recognition.

The body that launched a thousand Web sites

No, that wasn't AOL head honcho and keynote speaker Steve Case attracting the overflow crowds at the LA Convention Center last week. Rather, it was none other than Pamela Anderson Lee, former "Baywatch" actress and amateur video star. People trying to enter or leave the West Hall show floor last Tuesday had to fight their way through a crowd jammed eight deep around a rather dinky booth, where Celebritystreet.com was launching its Web site, www.celebst.com.

— *Doug Barney*

GTE, others play the name game

BY DENISE PAPPALARDO

LOS ANGELES — GTE Internetworking announced at Internet World 2000 last week it is changing its name to Genuity.

This development keeps the ISP in step with its parent company, GTE, which also announced that once its pending merger with Bell Atlantic is final, the joint company will be called Verizon.

And to complete the name-game circle, Bell Atlantic Mobile and Vodafone AirTouch said last week they will call their joint wireless entity Verizon Wireless (see story, page 91).

GTE Internetworking, now Genuity, is changing its name as it prepares to become an independent company. In February, GTE and Bell Atlantic told the Federal Communications Commission they were willing to spin off GTE's ISP in order to see GTE and Bell Atlantic's merger through.

It is not known if the FCC will take them up on the offer, but the ISP is moving ahead with its plans. Paul Gudonis, president of Genuity, says the change is not dependent on the FCC's decision but is instead prompted by market shifts.

"The name change is part of an evolving strategy to take advantage of the next Internet revolution," Gudonis says. The company likes the fact that the name Genuity is a derivative of ingenuity, he says. He added some at the ISP wanted to go back to the ISP's roots and rename GTE Internetworking BBN Planet. Those folks lost out. GTE acquired BBN Planet in May 1997 and renamed the ISP GTE Internetworking four months later.

But the name Genuity is not new either. In November 1997, GTE Internetworking acquired the San Francisco Web-hosting company Genuity. By choosing a name the ISP already owned and hasn't used since the acquisition, they were able to avoid the exhaustive trademark and URL searches typically done when naming or renaming a company.

At the press conference, Gudonis also said Genuity signed a deal with Akamai to deploy Akamai's FreeFlow content-distribution servers throughout its network. Genuity will offer FreeFlow services in addition to its current content-distribution services, which are based on Inktomi servers and Genuity's Hopscotch load-balancing technology.

In other Internet World news:

- Akamai introduced its Traffic Analyzer and Reporter tools that offer FreeFlow content-distribution customers real-time and historical information on Web site performance.
- Sprint announced it is offering Microsoft Windows 2000 Advanced Server and Site-Server Commerce Edition Web hosting services to business customers. Win 2000 Advanced Server includes Microsoft SQL Server 7.0, which is used for advanced cataloging and database storage. ◪

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Legato manages heterogeneous clusters

BY DENI CONNOR

PALO ALTO — Legato last week introduced two software packages that let customers cluster an unlimited number of Linux servers for fault tolerance and increased availability.

Dubbed eCluster and Legato Cluster Enterprise, they are the first products for Linux clustering that work in mixed Linux, Windows NT and Unix networks. Both packages support Caldera's OpenLinux eServer 2.3 and Red Hat Linux 5.1. Negotiations with TurboLinux and SuSE are in the works, Legato says.

ECluster is designed for Web server farms. Legato Cluster Enterprise aims at enterprise resource planning, database and messaging applications. ECluster and Cluster Enterprise previously were available for Unix and NT.

ECluster also ships with a tool kit that enables it to work with Apache Web servers and a Perl scripting language that lets users configure, manage and automate tasks. Servers clustered with eCluster software can also be load balanced using Cisco's Local Director.

"Although our primary reason for looking at clustering technology is high availability, load balancing is a close secondary driver," says Kurt Wong of Visa International. He has been using Veritas software to cluster his Windows NT and Sun Solaris servers.

While several smaller vendors have announced software that lets homogeneous Linux servers be clustered for brute-force number-crunching and parallel scientific computing, Legato is the first to introduce scalable clustering software that runs on a variety of platforms. Veritas, its closest competitor, does not yet have Linux or Windows 2000 plans, although it is expected to introduce such plans this summer.

Failsafe

The company also introduced Legato wanCluster for Solaris and HP-UX, software that provides failover support between geographically distant sites.

Software included with wanCluster provides remote-site configuration and maintenance, and controls the resynchronization of data back to the original site if failure occurs. WanCluster works across T-1, T-3, ATM or IP connections.

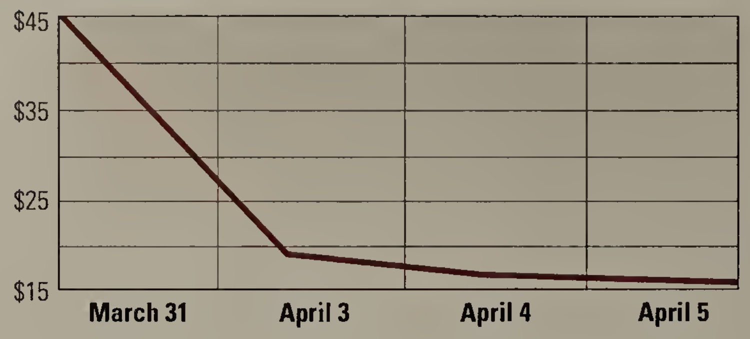
ECluster and Legato Cluster Enterprise cost $2,000 and $8,600 per Linux server, respectively. Legato Cluster Enterprise for EMC starts at $3,400 per NT server. ECluster for EMC Celerra costs $2,000 per server.

Legato: www.legato.com

Legato's stock takes a dip

Legato deferred filing its annual report recently when the company learned that a small number of its sales representatives made "side agreements" involving about $7 million of fourth-quarter 1999 revenue. That announcement last week appears to have taken a toll on the company's stock price.

Legato's stock price



SOURCE: NASDAO

Neoware debuts thin version of Linux

BY APRIL JACOBS

Thin-client maker Neoware jumped into the Linux swirl this week with a thin version of Linux — and a hardware box to back it up — designed for everything from cash registers to security appliances.

NeoLinux, Neoware's thin version of Red Hat's Linux, is aimed at thin clients and can also be used for specific application boxes such as corporate security card readers, cash registers and firewall devices.

In conjunction with its release of NeoLinux, Neoware debuted a thin client dubbed Eon, or "The Anything Box," that can be configured with additional third-party software and add-in hardware for wireless applications, thin-client applications or point-of-sale applications. NeoLinux sells for $50 per client, while a complete Eon thin client loaded with NeoLinux sells for about $499.

What makes NeoLinux valuable is the ability to save on licensing fees when compared with Windows, and the customizability that comes with being an open source operating system.

Users can also implement Eon and use Neoware's ez-Manage software, which lets Eon be remotely configured and updated.

"It's a very clever thing to do that opens up a lot of markets for them," says IDC analyst Dan Kusnetzky. "NeoLinux will be very flexible, and a lot of people who may not have been able to do a custom system could do so using this."

Kusnetzky says NeoLinux could be used in conjunction with any thin-client device to connect to a Linux server running applications, or with other servers such as a Windows NT server using Citrix's MetaFrame and the Independent Computing Architecture (ICA) protocol along with Windows Terminal Server.

Security Applications in Fishkill, N.Y., intends to use NeoLinux — and Eon — to put together turnkey systems for clients with multiple security devices such as card readers and surveillance cameras, says Dave Swartz, Neoware's vice president. The firm's software can be put on a single Eon to control multiple devices for less than it would cost using a PC or workstation.

Neoware's NeoLinux operating system includes the ability to run local Linux applications while providing access to Windows 2000 and NT servers across a network via the Citrix ICA protocol, which lets users access applications for the Windows platform. A Netscape Navigator Web browser and Java Virtual Machine are provided for Internet environments.

Eon has an integrated National Semiconductor Geode processor, 10/100Base-T Ethernet, two serial ports, a parallel port, two universal serial bus ports, audio and up to 288M bytes of flash memory. ◪

Neoware debuts thin Linux offering

Neoware's NeoLinux is designed to work with:

- Thin clients.
- Firewall devices.
- Point-of-service devices such as cash registers.

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Management,
continued from page 1

(QoS) across a collection of resources.

The products' features let customers:

- Set group or individual priority access to bandwidth or other network resources.
- Monitor and manage specific parts of a company's network to see if they are receiving agreed-upon SLA levels.
- Drill into specific parts of a network to analyze underlying performance problems that disrupt QoS.
- Alert users when network resources are unavailable.
- Collect and assemble network statistics to create a map of a given department or business process, along with performance results.

While these companies may be approaching the issue from different angles, they are all part of a service-level management trend coming to IT, says Stan Schatt, an analyst with Giga Information Group, a Cambridge, Mass., consultancy. With the rise of SLAs comes the need to look at how well network resources are delivered to a given user, rather than just looking at thousands of devices on a network and evaluating their performance.

New on the net management front

Network management companies are looking to help customers monitor specific business processes, departments or applications with new products.

Company	Product	Description
Centricity	Project Eureka	Software that prioritizes users, workgroups or applications at the client level.
Open Network Enterprise	Net Investigator	High-granularity monitoring software that offers in-depth interpretation of network performance.
Edge Technologies	enPortal	Software that integrates data from various management tools for a single view of network operations.
Computer Associates	NetworkIT Service Level Management Option	Software that assists users in implementing and managing SLAs.

Concord Communications, with its Network Health product, has been delving into this service-level management area for some time, says Schatt, and now other companies are joining in.

For instance, the software start-up Centricity in Oregon plans to offer Project Eureka — a product that will implement QoS not through network devices or servers but by controlling the end user's client. While details on Eureka are sketchy, Centricity executives say the software has two parts: a control point, which can be a server or a desktop; and a client piece on the end user's desktop.

Customers define SLA policies in the control point. For instance, a certain user in a remote office gets a certain application at a certain time. The control point communicates with the client agents. If a nonpriority user is getting too much network bandwidth, violating the SLA level, the control point will communicate with that client agent and tell it to throttle down, Centricity executives say.

A "virtual help desk" program alerts users to SLA violations in real time. Further Eureka details and pricing will be announced in June.

Edge Technologies, a software vendor in Fairfax, Va., plans this summer to introduce enPortal — which will let customers integrate network, application and business process data into a single customizable portal on Windows NT and Unix servers. EnPortal can take data from a company's existing management products — such as Hewlett-Packard's OpenView — and integrate it with data culled from similar tools.

IS professionals can generate network performance reports based on a given process, such as transaction processing. This data can be shared with other members of the company or business partners to chart SLA compliance throughout a network. The tool will also offer a central point to manage a given business process or department regardless of the management application's platform.

Established vendors are jumping into the game, too. Computer Associates at its CA World show this week will detail NetworkIT Service Level Management Option, a software module for the company's NetworkIT network management suite. The module is available now for beta users. Pricing was not disclosed.

In the same vein is Open Network Enterprise's Net Investigator, a Java-based tool that collects SNMP data and other information from network devices. The package runs on Unix and Windows NT servers and contains a Java applet program called Web Inspector that gathers information about Web site performance.

The information is stored in an Oracle database and is used to create customized reports that detail the QoS performance of a group of devices or servers over a period of time — for instance, a group of e-mail servers supporting a sales department. These reports can be generated in chart form and shared with other business departments or can be used to interpret and detect network problems. Net Investigator is available now and starts at $9,000. ◪

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Showdown,
continued from page 12

Jeremy Millar, a developer with e-commerce software vendor Bowstreet. His company defines these as any kind of business function that is wrapped in XML so it can interact with any client device or with another service. XML is a standard that describes how data can be represented and shared through a Web page.

Millar's comments drew enthusiastic support from VA Linux's Chris DiBona, the company's Linux evangelist. "XML: Go for it. It will make things so much easier," he said. When another user said his company wanted to create Web interfaces for all company applications, DiBona told him, "XML will save your life."

But even Internet standards are adding to client confusion, said Randy Salo, vice president of engineering at Wireless Knowledge, the Microsoft and Qualcomm joint venture focused on middleware for linking wireless devices to corporate data. "There's a huge amount of discontinuity due to different markup languages," he said.

Web services don't have to be complicated, said Maggs, who cited services available to Palm VII wireless device users. Palm VII users have built-in access to Palm.Net, a Web site run by Palm, with content from an array of partners.

But DiBona argued Palm could only offer a carefully managed subset of information. "As new devices come out, people will not want to be limited," he said, chanting "XML, XML, XML." ◪

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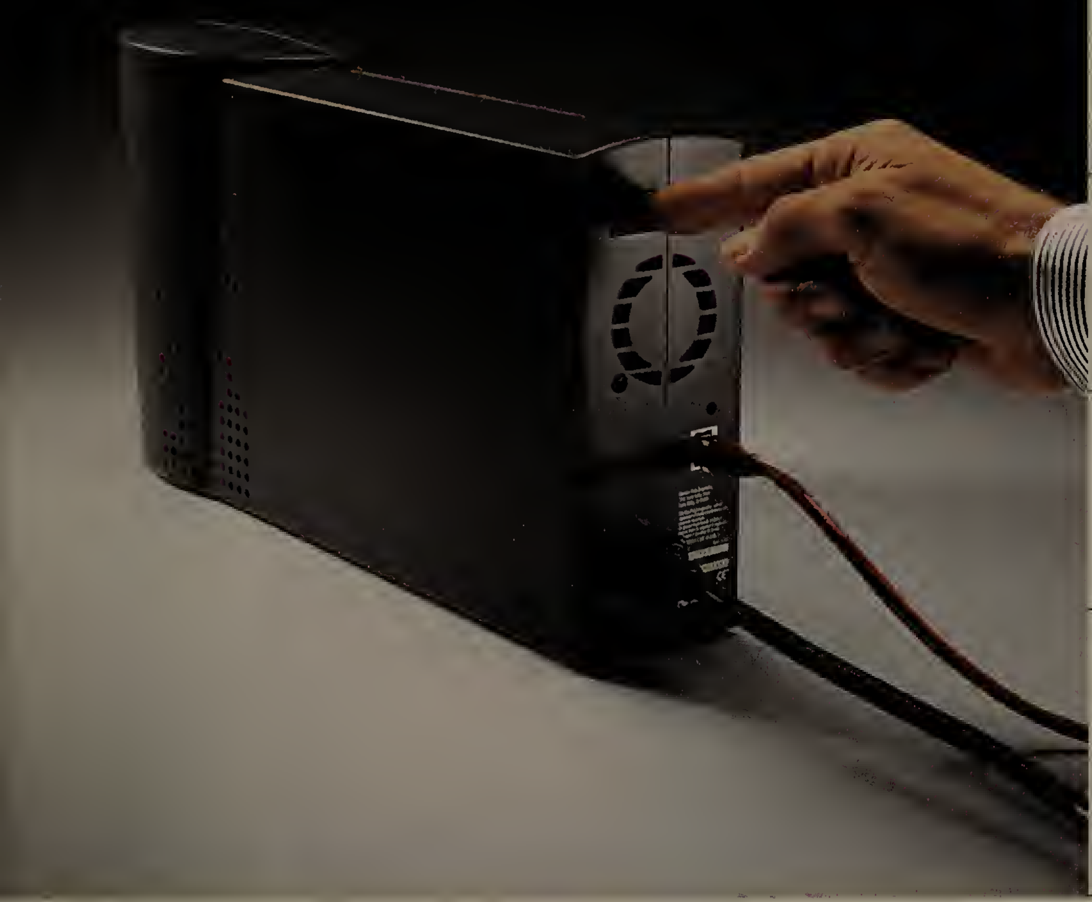

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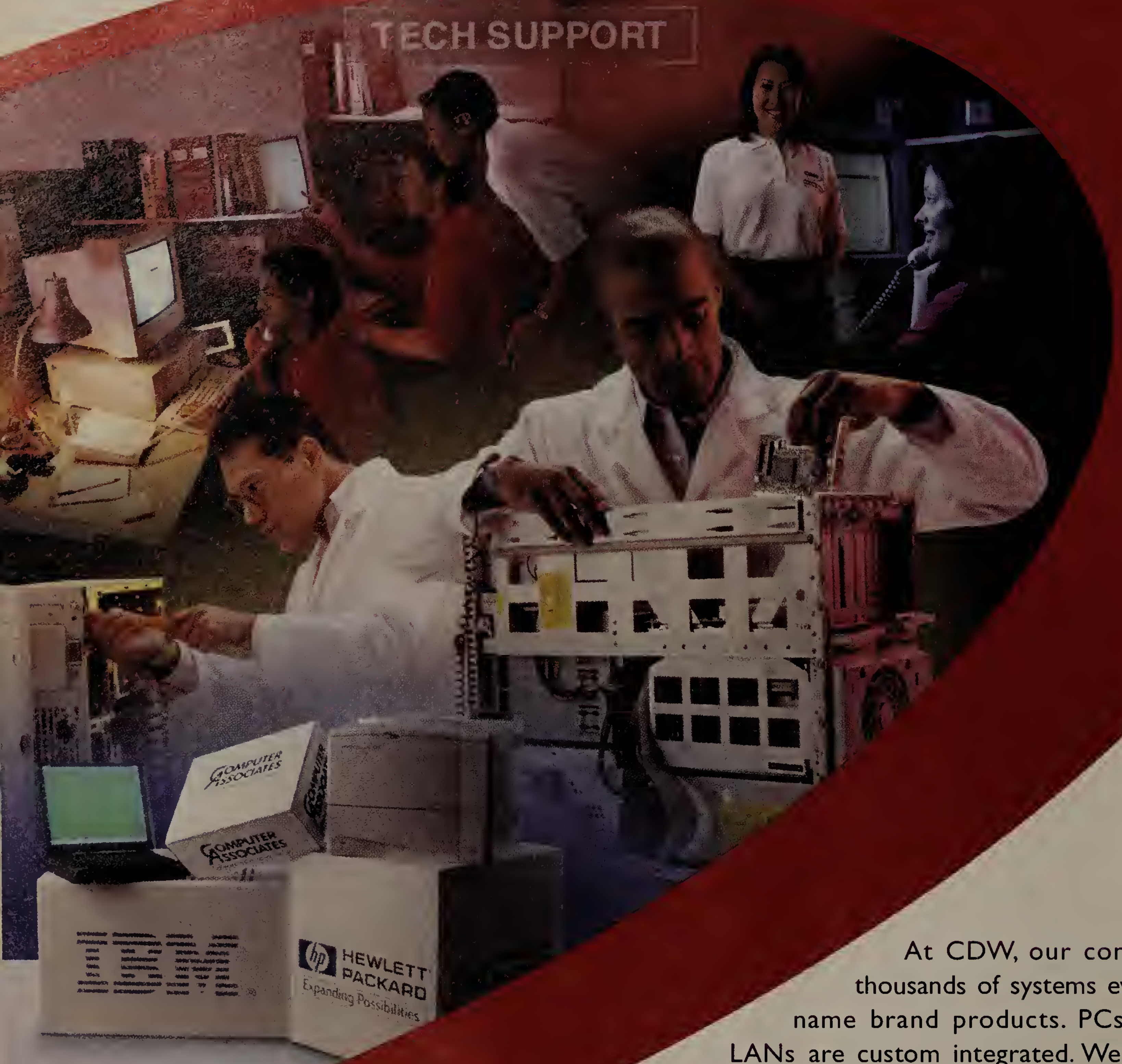

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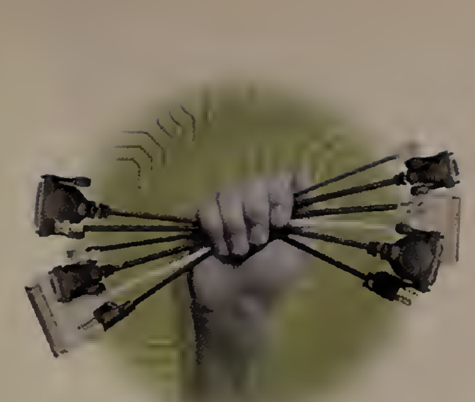


Infrastructure

TCP/IP, LAN/WAN Switches, Routers, Hubs, Access Devices, Clients, Servers, Operating Systems, VPNs, Networked Storage

Briefs

Lucent's Enterprise Networks Group — to be spun off as a separate firm later this year — last week announced a trade-in program for users of 3Com's LAN switches. 3Com said last month it would discontinue its CoreBuilder family as of June 30. Effective now through Sept. 30, 3Com users can trade in the switches for a variety of other products. For example, a free seven-slot Cajun P550 Gigabit Switch chassis can be had with each trade-in of select CoreBuilder 5000/9000 chassis and up to $770 for the trade-in of CoreBuilder 7000 ATM modules toward the purchase of Cajun M770 ATM modules.

Lucent: www.lucent.com

Intel last week announced support services for its network business. Intel's Netstructure support services include phone, hardware and software subscription support contracts and product installation support. The services support Netstructure switches, hubs, access and virtual private network products and routers. The services are available through Intel's network of value-added resellers, which will offer one- and three-year contracts. Prices will vary depending on the service and products purchased.

Intel: www.intel.com

Mapletree Networks is shipping a 168-modem card that can handle 56K bit/sec modem, ISDN, and voice and fax over IP calls on any port. MTN 5000 is a compact PCI card that supports Windows NT and Linux operating systems. The hot-swappable card has seven T-1 or Primary Rate Interface ISDN ports, each of which can carry 24 DS-0 phone channels, and costs about $10,000.

Mapletree: www.mapletree.com

Enterasys jumps into switching fray

BY APRIL JACOBS

NEW YORK — Cabletron spinoff Enterasys Networks last week was formally launched with a new high-end switch that will be part of a new family of devices aimed at enterprise users.

Users can expect better performance and more scalability from the new Matrix switch than from its predecessor, the SmartSwitch, says Brady Cole, product manager for Enterasys' Matrix series. The Matrix switch family ultimately will replace the high-end backbone SmartSwitches.

Enterasys is one of four companies recently launched through the split-up of Cabletron. The other three companies are Riverstone Networks, Global Network Technology Services and Aprisma Management Technologies. Each of the companies was launched to focus on different network arenas, including service provider infrastructure, enterprise support and services, and network management software.

Enterasys has the opportunity to act like a start-up, says company president Henry Fiallo.

The new Matrix E7 switch features embedded Layer 2 through Layer 7 network capabilities and designated Application Specific Integrated Circuit network chips on each switch module to increase performance over traditional shared ASIC switch module designs. The Matrix E7 has a throughput rated at 100 million packet/sec, compared with the SmartSwitch's 25 million to 30 million packet/sec.

Enterasys plans to come out with another switch by year-end that can process up to 250 million packet/sec. Other boxes are expected to fill out the family, but details of those devices were not provided.

The Matrix E7 can accommodate more than 500 standard or Fast Ethernet ports and more than 80 Gigabit Ethernet ports in each chassis. The Matrix chassis can hold up to seven switch modules

See **Enterasys**, page 24

Microsoft tool eases site server configuration

BY JOHN FONTANA

Microsoft has released a free utility designed to help network professionals automatically and optimally configure the recently released Internet Information Server (IIS) 5.0 package.

Internet Server Security Configuration Tool (ISSCT) walks users through the process of setting up the IIS 5.0 Web server — which is built into Windows 2000 — with a series of checkboxes for services such as FTP or Network News Transfer Protocol. The utility also asks if the Web server will handle static or dynamic content and whether connections are needed for other back-end systems such as databases.

The utility is intended to provide a hard-line evaluation of what services are activated on IIS and is designed to error on the side of caution so users don't leave security gaps in their base configurations. Services left open on a Web server potentially could become playgrounds for hackers.

The configuration checklist is similar to the one Microsoft produced for IIS 4.0, except the ISSCT tool is online and automated. IIS 4.0 provided a paper cheat sheet server administrators had to carry around during installations. ISSCT not only guides users through the configuration, but also saves the configuration file so it can be reused on other machines.

Microsoft is positioning the utility as the first step in setting up secure Web servers, arguing that services not in use should be locked down.

"It sounds more like a management tool with the benefit coming for people who have to deploy multiple servers," says Jim Hurley, an analyst with Aberdeen Group. "If you're talking about a tool that does such things as set policies on the firewall and test them before distributing those policies to servers, that's security."

Microsoft officials acknowledge that the first version of the tool is mostly for configuration but claim configuration is a foundation for good security.

"We know that the vast majority of security break-ins happen because of misconfigurations," says Scott Culp, a security product manager for Microsoft. "What we are trying to do with this tool is close some of those problems off."

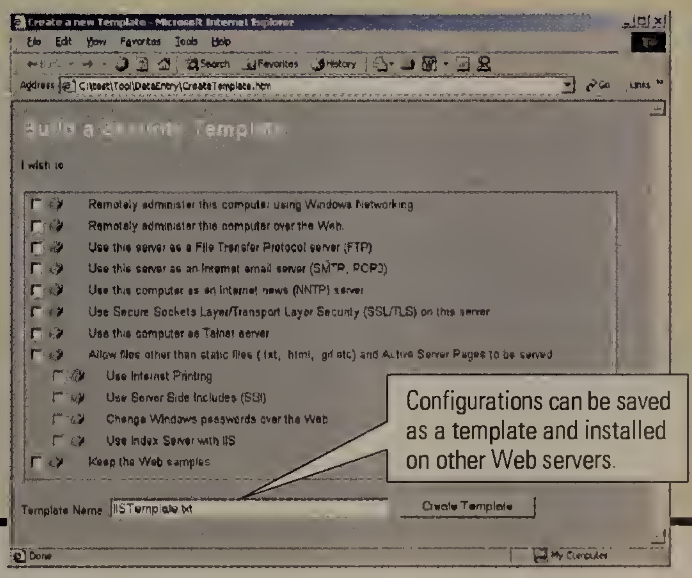
Culp says future enhancements will include mechanisms for staying up-to-date on patches and security maintenance, and support for servers with multiple network interface cards.

Users should take caution when using ISSCT. It can make servers inaccessible to anything but Web services, because it can cripple any service not required by IIS.

Microsoft: www.microsoft.com/technet/security/tools.asp

Server setup

Microsoft's Internet Server Security Configuration Tool helps walk administrators through the process of activating services on their Internet Information Server 5.0 Web servers.



Create a new Template - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Search Favorites History
Address C:\Isset\Tool\DataEntry\CreateTemplate.htm
Go Links
Done
My Computer

I wish to

☐ Remotely administer this computer using Windows Networking
☐ Remotely administer this computer over the Web.
☐ Use this server as a File Transfer Protocol server (FTP)
☐ Use this server as an Internet email server (SMTP, POP3)
☐ Use this computer as an Internet news (NNTP) server
☐ Use Secure Sockets Layer/Transport Layer Security (SSL/TLS) on this server
☐ Use this computer as Telnet server
☐ Allow files other than static files (txt, html, gif etc) and Active Server Pages to be served
  ☐ Use Internet Printing
  ☐ Use Server Side Includes (SSI)
  ☐ Change Windows passwords over the Web
  ☐ Use Index Server with IIS
☐ Keep the Web samples

Template Name: IISTemplate.txt

Create Template

Configurations can be saved as a template and installed on other Web servers.

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Latitude improves voice/data conferencing

BY JASON MESERVE

SANTA CLARA — For companies looking to save money by eliminating travel and having more collaboration done electronically, Latitude Communications may have an answer.

Latitude hopes its new MeetingPlace 2000 will let corporations put conferencing capabilities on every desktop. The release features voice-over-IP support, integration with Microsoft Exchange and Lotus Notes, and browser and Palm VII access for scheduling and launching a conference.

At its core, MeetingPlace is an audio- and data-conferencing server.

Users listen and talk to one another over the phone, and share data and applications on their PCs using a T.120 document conferencing-compliant application such as Microsoft NetMeeting. The server uses a real-time operating system and can handle up to 120 concurrent connections, though multiple servers can be linked for greater capacity, says Bob Tate, vice president of marketing at Latitude.

As a means of boosting capacity, Latitude is building a server architecture that is client agnostic.

On the audio side, Latitude will support plain old telephone service, soft phones, IP PBXs, PBXs and streaming audio (for listen-only participants). Latitude and Cisco are currently testing how Cisco's CallManager line and MeetingPlace work together, Tate says.

A way in

For data conferencing, MeetingPlace 2000 will work with Microsoft Exchange Server 2000, NetMeeting 2.0 and Lotus Sametime. To make the product friendlier to corporate firewalls, Latitude has developed a technology that lets the T.120 protocol tunnel through the firewall, so outside users can participate in the conference, as well.

With this release, users will be able to schedule and join conferences from a built-in Web portal called InfoCenter, handhelds, groupware systems (Notes and Exchange), as well as by phone.

The MeetingPlace 2000 could let customers put video on every desktop.

Once a conference is scheduled, the server sends out e-mail notification to each participant with a link that will connect them to the conference. Users, including those on the Palm VII platform, will also be able to instruct the server to "find" conference participants by dialing a preset list of phone numbers (desk, mobile and home) for each participant. Tate says this feature is handy for those that have to set up emergency or ad hoc meetings on the fly. Users can call into the server or have the server call them to join a conference.

Kelly Dwyer, chief information officer of Mercer Management in Lexington, Mass., is excited about some of the new features Latitude is planning. He's already saved his company money on conferencing costs by bringing the Latitude server in house.

He says the company is using 100,000 minutes of conferencing per month.

"Literally, we only have to pay network access charges [for the data conferencing] and basic long distance," Dwyer says. He's cut out the cost of the third-party hosting the conference.

Looking ahead, Latitude hopes to add video-streaming capabilities, as well as a means of capturing everything that happens during a conference, including the data-conferencing portion, according to Tate. The current version of Latitude can only capture the audio portion.

MeetingPlace 2000 starts at around $100,000 for the server, with the Web component priced at $4,995 per server and the data-conferencing piece at $275 per concurrent user. Support for voice over IP and mobile users as well as the Web component will be available in the second quarter. ◪

Novell bolsters storage software

BY DENI CONNOR

NetWare 5 users will soon be able to more quickly add storage capacity and monitor disk space with a support pack Novell will ship this month.

Dubbed Support Pack 1 for NetWare 5.1, the software lets network executives mount Novell Storage System (NSS) volumes in seconds rather than hours, mirror that storage for fault tolerance and manage end-user disk space.

Software mirroring allows data to be written concurrently to two disks connected by the same SCSI controller to increase data integrity. NSS has supported hardware mirroring since its introduction. Quota management customers monitor the amount of available disk space, limit disk space per user and regain disk space if necessary.

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"We normally set disk quotas for people to handle all the student accounts," says Sean Eckton, a network engineer at Brigham Young University in Provo, Utah. Eckton says he has stayed with NetWare 4.11 servers because he couldn't set disk quotas with NSS. Now that the capability is available, "We'll be moving to NetWare 5.1 with NSS," he says.

When Eckton was working on the migration from NetWare 4.11 to 5, he built more disk space into clients' PCs than they would need because he knew he couldn't set quotas for a while.

NSS uses advanced journaling algorithms to speed the remounting of up to 255 NetWare volumes after the system fails or a network executive takes a server down. The software also lets up to eight trillion files — up to 8 terabytes — be stored on a NetWare volume. Previously, NetWare 5 networks with NSS installed did not support disk quotas or mirroring.

NSS still does not support a number of features: block sizes smaller than 4K bytes, data compression, referential integrity made possible by the Transaction Tracking System or NSS SYS volumes. Further, NSS does not support data migration, file locking, file system auditing or disk duplexing, in which data is copied to two disks on different controllers concurrently.

Support Pack 1 for NetWare 5.1 will be available for free download from support.novell.com/misc/patlst.htm. ◪

Enterasys,
continued from page 21

and two redundant power supplies. Switch throughput is rated at 100 million packet/sec. The closest competitors to the initial Matrix offering are Cisco's 6500 and 3Com's CoreBuilder 9000.

The Matrix E7 has a modular price scheme. The chassis costs $6,995, while individual switch modules are priced at $12,995 each. Each power supply (two are recommended for redundancy) costs $1,995. Volume shipping will begin this month.

For users looking at switches for Internet telephony (voice over IP), e-commerce or bandwidth-intensive applications such as enterprise resource planning, the Matrix switches could be a boon, even if those types of applications are still in the future, because it provides more headroom than older switches and performs at three times the rate of its predecessor, the SmartSwitch.

GETTING
THE ENTERASYS
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DocFinder 7627
find it online

Cabletron should be able to make a successful play in the high end, which has traditionally been a strong market for the company, because of its strong service and support record with loyal customers, says Colin Hay, an analyst with Gartner Group in Stamford, Conn.

Hay says Cabletron's strategy of splitting up its hardware, network management software and services organizations is a good one for customers who have heterogeneous networks with multiple vendors' technology installed, because it gives those groups a better chance of competing for business with companies that might not have considered them.

The Enterasys launch in New York was also a way for Cabletron to make some noise about its new strategy and spinoffs. Henry Fiallo, president of Enterasys, says splitting off divisions that were held closely together in the past will help each organization focus on what it does best.

"We have the opportunity to think like a start-up," Fiallo says.

Enterasys: www.enterasys.com

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Veritas bolsters NT cluster software

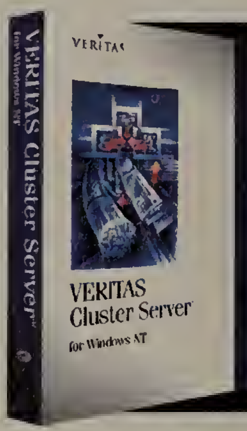
BY DENI CONNOR

Veritas has announced a variety of software packages that will make it easier for network professionals to cluster and manage large numbers of Windows NT servers for disaster recovery purposes.

One software package, called Veritas Cluster Server for NT, lets customers create Windows NT server clusters and monitor their activity and status in real time. The package complements software Veritas ships for Solaris and HP-UX. Veritas also announced Global Cluster Manager for Solaris and Volume Manager for NT, as well as Remote Storage for Microsoft Exchange.

Veritas Cluster Server for NT supports automatic and manual failover from one server to any other server in the cluster, letting customers manage maintenance activities and unplanned downtime. Anywhere from two to 32 Windows NT nodes can be clustered using Cluster Server for NT.

"Veritas Cluster Server for NT is an important product because it enables key applications such as Microsoft Exchange, Internet Information Server, Lotus Domino and SQL Server to scale to meet enterprise-size needs," says Dan Tanner, an analyst at Aberdeen Group in Boston.



Veritas Cluster Server features

- Clusters two to 32 servers.
- Manages multiple clusters up to 256 servers.
- Provides automatic and manual failover.
- Software for clustering Solaris and HP-UX.
- Costs $3,000 per server pair.

The management software that ships with Veritas Cluster Server for NT can monitor up to 256 server clusters from a single console.

"It's critical that the environment is highly available," says Karen O'Neill, manager of technical services for Toysmart.com, an online toy reseller in Waltham, Mass. "Every order we receive on our Web site is processed through a fulfillment distribution system in order for it to be picked, packed and shipped to the customer."

O'Neill uses Veritas Cluster Server for Solaris and is looking at the NT product to cluster the company's SQL Server databases that run the company's inventory information.

Veritas Cluster Server for NT will be available in August for $1,500 per server processor and $500 per managed application. A typical two-node, single-processor server cluster for Microsoft Exchange would cost $3,500.

The firm also announced that its cluster management product, Global Cluster Manager for Solaris, will be available in June. The software manages geographically separated clusters from a single console and provides failover capability between servers across WAN links. Veritas has not set pricing yet.

"With Global Cluster Manager, we have a bird's-eye view of the health of the clustered environment," O'Neill says. "It provides us with the tools to failover an application to a secondary server and determine how everything is functioning. We are able to perform necessary maintenance and apply patches without suffering any downtime."

Veritas also announced Volume Manager for NT, software that customers can use to create and manage storage volumes. Volume Manager also increases network availability by failing over storage drives to each other. The package will ship in June. Pricing ranges from $1,700 for a single CPU to $6,600 for an eight-CPU server.

Veritas: www.veritas.com

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Wired Windows . Dave Kearns

MAJOR LEAGUE EFFORT, MINOR LEAGUE PERFORMANCE

Can you hit a home run and strike out in the same at-bat? If you said "no," then you weren't at Novell's BrainShare in Salt Lake City late last month.

Let's look at the home run first.

For the first time in years, Novell is delivering a clear message about where it is going and how it hopes to get there. Novell intends to be the "fabric" of the net, and that's one net — Internet, intranet and extranet.

Under the rubric of the Directory Enabled Network Infrastructure Model, the company wants to be the software plumbing of this worldwide network.

The primary focus is eDirectory (formerly NDS), but it's almost as if Eric Schmidt and his pals have decided that the directory is a given and they're now moving on to the directory-enabled services and applications that will drive business-to-business, business-to-consumer and person-to-person communication on the 'Net.

No less important is another focal point — network appliances. Novell's Internet Caching Server (ICS) was the first and with new OEM partnerships coming almost weekly, it could soon be ubiquitous.

Introduced this year was a network-attached storage appliance, again to be manufactured by traditional computer hardware makers but powered by the NetWare kernel. It looks like a home run to me.

Unfortunately, many BrainShare attendees might have thought of the week as a strikeout. This, after all, is the hard-core network crowd — network managers and administrators in businesses and universities from around the world. They came to hear about NetWare, and they were disappointed. The network operating system was mentioned in passing, but the focus of the event remained the 'Net. Even when Novell icon Drew Major spoke at the March 31 keynote session, he got a standing ovation initially, but the audience then sat on their hands through a seemingly endless stream of demos of Internet technologies.

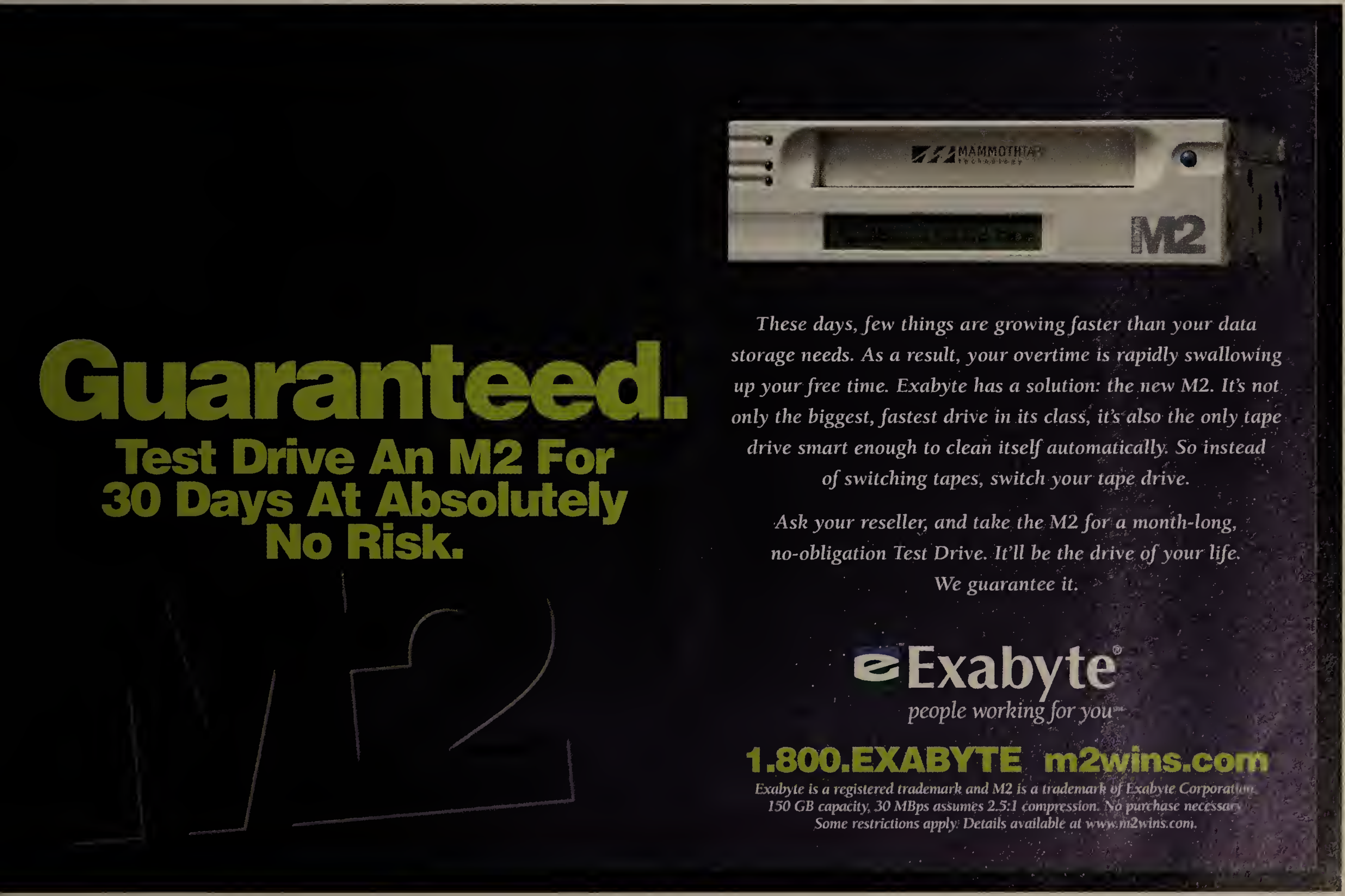
Schmidt reaffirmed his commitment to sell NetWare "for 100 years and more." But will it be the NetWare the faithful have come to know and love, or will it be simply eking out an existence as the kernel running the network appliances?

Novell delivered an impressive message and certainly looked like a company that is ready to be a major player. But Novell, was this the right audience to hear that message?

Kearns, a former network administrator, is a freelance writer and consultant in Austin, Texas. He can be reached at wired@vquill.com.

Tip of The Week

Novell is taking BrainShare on tour (http://www.novell.com/events/brainshare/tour/) and I'll be joining the tour in Dallas and San Antonio. Look in next week's Focus on NetWare newsletters (http://www.nwfusion.com/focus/) for details on the sessions I'll be holding.



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How to take data storage traffic off the network

BY DENI CONNOR

NETWORK STORAGE

LAN-free and serverless back-up technologies show promise.

Eager to relieve traffic from the network and server, network professionals are looking to serverless and LAN-free backup, two emerging technologies made possible by storage-area networks (SAN) and network-attached storage.

As the amount of data storage grows, the time it takes to back it up increases and the amount of traffic it produces can slow down the network. Add to that the tedious nature of network backup and you have a situation that is rapidly becoming an administrative nightmare.

LAN-free backup promises to relieve networks of traffic destined for storage by moving the back-up data from networks and putting it on servers connected to storage devices by switches or routers on Fibre Channel networks (see graphic).

In LAN-free backup, a Fibre Channel network adapter is installed in each server. The adapter connects to the server's PCI bus and its applications on one end and to a Fibre Channel hub or switch on the other end via fiber-optic or copper coaxial cable. The hub attaches to a single or multiple tape libraries or disk arrays. Other network servers attach to the hub in the same fashion.

Software residing on a server spawns the back-up process on each of the other servers. Data flows from the storage arrays to the back-up device located on the Fibre Channel storage network, bypassing the corporate network. A number of storage hardware vendors, including EMC and IBM, and back-up software vendors Computer Associates, Veritas and Legato, are implementing the technology in their products.

"Every user has a back-up problem that is getting worse, not better," says Steve Duplessie, an analyst with Enterprise Storage Group in Milford, Mass. "LAN-free and serverless back-up technology allows users to back up the network and, more importantly, recover data at 10 times the speed of current methodologies, while freeing up the LAN, system CPU and memory cycles."

The idea is catching on.

"We've been exploring [LAN-free and serverless backup] for about eight months now," says Stephen Lopez, director of IT architecture at the National Board of Medical Examiners in Philadelphia. "When we drew our back-up process logically, we saw that the data was leaving the server and going out on the wire to only go back on the server to be backed up. It was ridiculous."

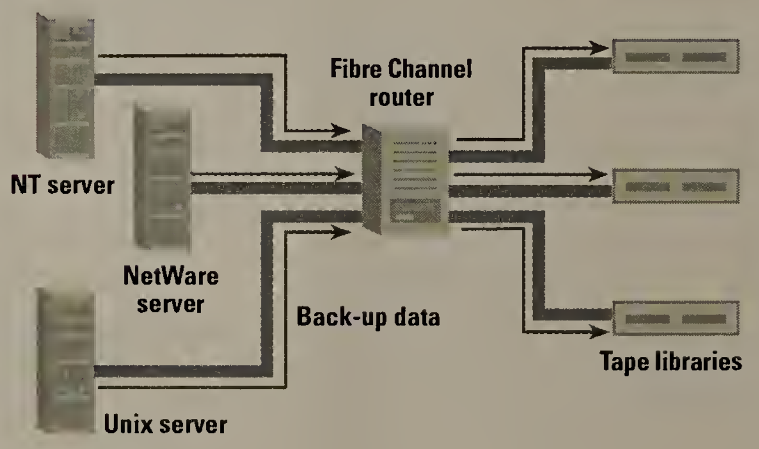
Lopez' daily backup, which amounts to about 500G bytes, takes 14 hours.

Victor Loy, a LAN engineer at Lockheed Martin in Little Rock, Ark., manages a Windows NT network.

Alternative backup strategies

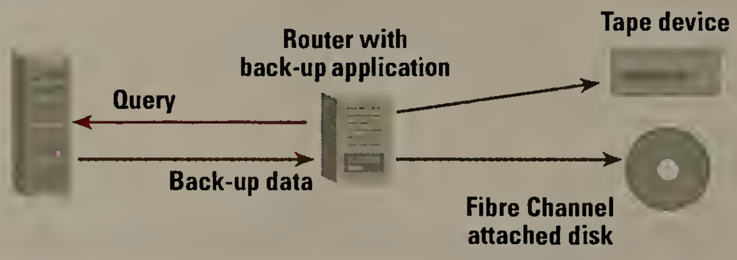
LAN-free backup

① A Fibre Channel adapter in the server connects its PCI bus to a Fibre Channel hub or router. The tape library or tape device attaches to the hub, and data flows between the server and the back-up device.



Serverless backup

② An intermediate device such as a hub or router initiates the backup. It contacts the server to ask what data is available, and upon receiving a list from the server, proceeds to start the transfer of data between the storage array and the tape device.



"LAN-free [technology] will give me better availability to back up," Loy says. "When I back up now, I put a [150G-byte] load on the network. If I can add another network adapter in the server and run the backup on a separate independent network, it will free up the primary network for the users that are on it."

Duplessie adds, "LAN-free backup simply eliminates the LAN from the back-up path. It automatically switches a tape drive from one node to another directly, without moving the data from the second node over the LAN." Duplessie says that while LAN-free backup is an improvement over traditional LAN-based backup, "it still sucks the life out of the server and will potentially perform 10 times slower than serverless technology."

Serverless backup takes LAN-free backup a step further. The technology removes the processing from the server and moves it to an intermediate device such as a Fibre Channel switch or router, or free workstation, freeing the server to process information requests and perform other tasks.

The back-up application, running on the intermediate device, queries the server and identifies the information that needs to be backed up. The server sends this information to the back-up application. The application, which has access to the Fibre Channel storage devices, then performs the copy block by block from disk to tape, also dubbed extended copy or the third-party copy specification. Third-party copy became a standard when it was added to the SCSI-3 standard and adopted by the American National Standards Institute and the Storage Networking Industry Association.

Lopez is looking for an application that will back up his Windows NT and Solaris server networks. "I can take my Sun storage, connect it to a Fibre Channel router and also take my Compaq [Windows NT] storage, and hopefully I can get a single management console that does the back-up independent of the operating system using the extended copy technique," he says.

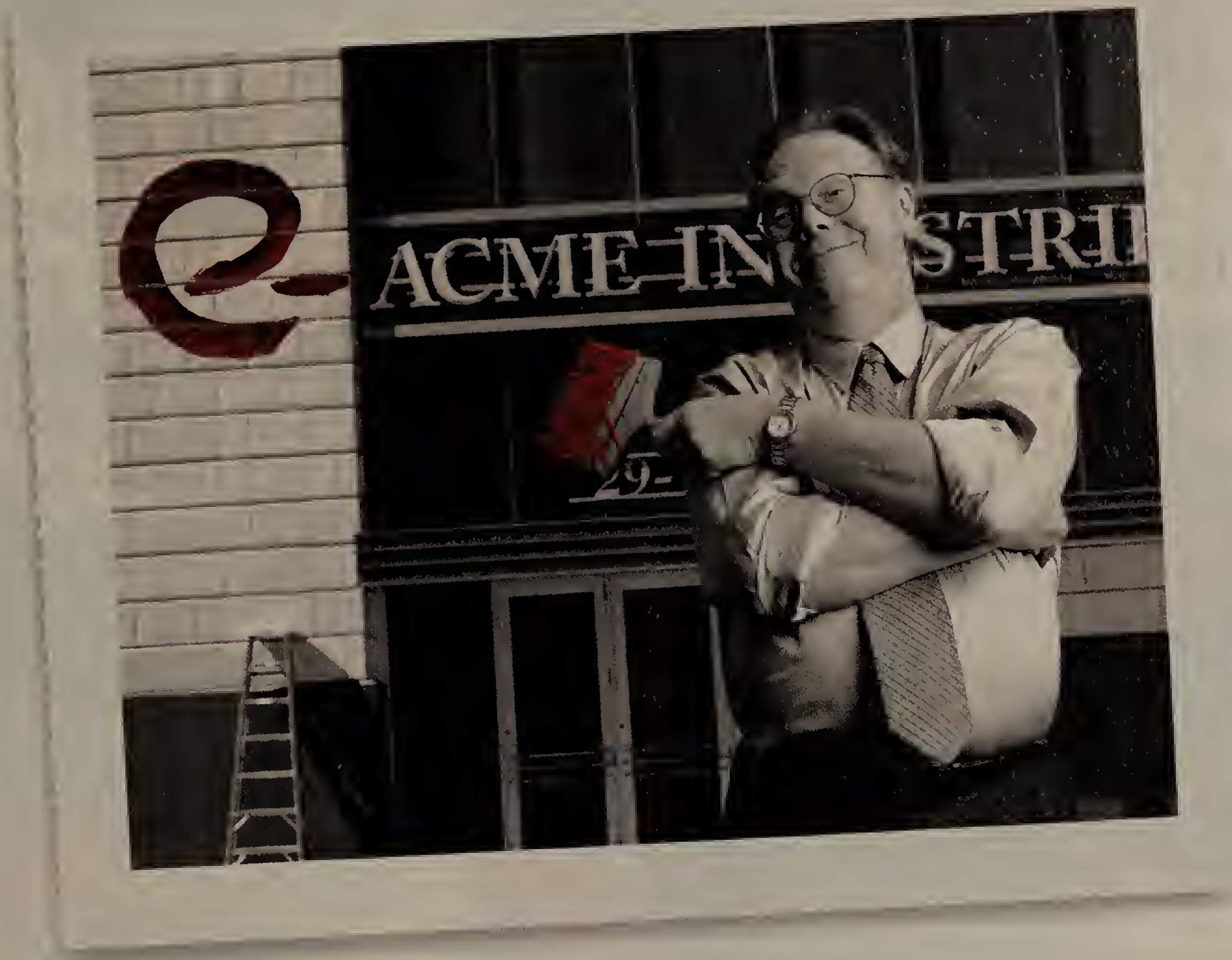
This feature removes the server from the data path, eliminating the need to copy data to and from host memory, as well as reducing CPU overhead.

The LAN-free vendors — IBM, Veritas and Legato — also have serverless back-up capability. In addition, CA will add serverless back-up features to its SAN integrated Technology Initiative storage network software this year.

In spite of users' enthusiasm for backup that frees up network and server traffic, Lopez says all the pieces are not here yet. Lopez implemented a SAN almost two years ago for Sun and Windows NT, and is still waiting for everything to come together. "Only now are the products coming forth that will let us do serverless backup. SAN technology was a godsend for all my storage, but I couldn't do backup over it," he says. Software from Veritas and Legato have yet to ship.

"There's no single product that's going to let us do it exactly," Lopez says. "Certain manufacturers don't let us do an exact data copy from device to device and Fibre Channel switch them. We're right on the edge."

SAN adoption rates are still low, even though it is one of the most hyped technologies ever, says Duplessie. "Users are still waiting for an absolutely compelling reason to make a major infrastructure change." ◪



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☐ 203 Carrier Service Reseller
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☐ 205 CLEC/CAP
☐ 206 Interconnect
☐ 207 International Carrier/PTT
☐ 208 Internet Service Provider
☐ 209 IXC/Fiber Network
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SPECIAL LUNCHEON KEYNOTE ADDRESSES

1:00 pm – 2:00 pm, Monday, June 5

GTM/IEC Luncheon Keynote

Keynote: John W. Sidgmore, Vice Chairman, MCI WorldCom & Chairman, UUNET

12:15 pm – 2:00 pm, Tuesday, June 6

IEC Information Industry Luncheon Presentation

Keynote: F. Duane Ackerman, Chairman & CEO, BellSouth

12:30 pm – 2:00 pm, Wednesday, June 7

IEC Information Industry Luncheon Presentation

Keynote: John Roth, President & CEO, Nortel Networks

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TAP THE MINDS OF INDUSTRY LUMINARIES

FREE Keynote, Plenaries and Addresses take place June 4 – 8 and will feature:

Global Industry Directions Plenary Session

5:00 pm – 5:45 pm, Sunday, June 4
Keynote: Richard H. Brown, Chairman & CEO, EDS

SUPERCOMM Plenary Panel – CLEC Focus

8:00 am – 9:15 am, Monday, June 5

Royce J. Holland, Chairman & CEO, Allegiance Telecom

Robert E. Knowling, President & CEO, Covad Communications

Michael A. Sternberg, President & CEO, KMC Telecom

SUPERCOMM Opening Keynote Address

8:00 am – 8:45 am, Tuesday, June 6
Keynote: John D. Zeglis, President, AT&T and Chairman & CEO, AT&T Wireless group

SUPERCOMM Plenary Panel – Access, Broadband and Competition: The Regulatory ABCs for Today's Telecommunications Marketplace

9:15 am – 10:30 am, Tuesday, June 6
William Kennard, Chairman, Federal Communications Commission

The Honorable William Kennard will open the panel, which will highlight the challenges and opportunities for regulators in accelerating the growth of telecommunications markets around the world. Chairman Kennard will moderate the ensuing panel session that will include colleagues from regulatory agencies in Asia-Pacific. The Chairman will also discuss his initiative announced last year, which focuses on telecommunications development in developing countries.

SUPERCOMM Plenary Panel – Wireless: Networks for the Future

8:00 am – 9:00 am, Wednesday, June 7
Chair: Keith W. Kaczmarek, Senior Vice President, Teligent
Panelists: *Martin Cooper, Chairman, Co-Founder & CEO, ArrayComm ▪ Bo Hedfors, Executive Vice President, Motorola & President, Motorola Network Solutions Sector ▪ Nathan M. Kantor, President & COO, WinStar Communications ▪ Michael L. Margolis, President & CEO, Tekelec ▪ Dennis O'Connell, Regional President, North Region, NextLink Communications ▪ Larry Schwartz, Group Vice President & GM, Compaq Computers ▪ Kari-Pekka Wilska, President, Nokia*

SUPERCOMM Evening Keynote Address

5:15 pm – 6:00 pm, Wednesday, June 7
Keynote: Edward J. Zander, President & COO, Sun Microsystems

SUPERCOMM Closing Keynote Address

8:00 am – 9:00 am, Thursday, June 8
Keynote: Robert W. Lucky, Corporate Vice President, Telcordia Technologies & Chairman, FCC Technical Advisory Committee

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Carriers & ISPs

The Internet, Extranets, Interexchange
and Local Carriers, Wireless, Regulatory Affairs

Briefs

Touch America, the carrier buying **Qwest Communication's** long-distance business in the **US West** region, announced that its parent company is spinning off its energy businesses to concentrate on telecommunications. The parent, **Montana Power**, will get rid of electricity, natural gas, coal and oil interests to reshape itself as a next-generation carrier rather than a traditional, dividend-paying utility. Qwest said they chose Touch America to take over the US West region long-distance voice and data business because telecom won't be a sideline for the new player. Qwest soon won't be able to carry long-distance traffic in the 14-state US West region because it is buying US West, which doesn't yet have the required state-by-state long-distance approvals.

Cable & Wireless signed its largest wholesale Internet access customer last week. **Microcast**, an Internet video streaming services company, signed up to buy 24 OC-12 lines to connect Microcast's video servers to the Cable & Wireless Internet backbone. The deal is valued at $91 million. Microcast offers live and archived streaming video services to advertisers and content providers.

By the end of the month, **Bellsouth.net** is expected to launch a virtual private network (VPN) service that will support dedicated Internet access between multiple locations. Although the ISP supports dedicated VPN services for customers on a case-by-case basis, its Virtual Private Dial Network is its only formal VPN offering. Bellsouth.net is also building more Web hosting data centers.

Bellsouth.net: www.bellsouth.net

MCI WorldCom to offer hosted e-mail

Carrier enlists Critical Path to provide a range of options, including Microsoft Exchange.

BY DAVID ROHDE

ATLANTA — MCI WorldCom last week jumped into the hosted e-mail applications business with the help of Critical Path, a major messaging vendor in San Francisco.

The carrier announced the immediate availability of MCI WorldCom Managed E-mail, a service that provides options ranging from Internet e-mail to a hosted Microsoft Exchange enterprise platform.

E-mail outsourcing currently appeals to a minority of enterprise users, although the number is growing, according to analysts. Gartner Group in Stamford, Conn., estimates the market will reach $1.3 billion by the end of the year.

In reality, the new MCI WorldCom service itself will be mostly coming from Critical Path. Critical Path provides POP3 and Internet Messaging Access Protocol e-mail hosting service from several sites around the country and the fully hosted Microsoft Exchange service from one site in California.

MCI WorldCom will now private-brand the offerings and add it to their billing. Its sales force and Tier 2 technical support personnel will also be trained on the product. Pricing will range from $2 to $22 per seat per month, depending on the options chosen by users.

Messaging options in the network

Sample monthly prices per seat of MCI WorldCom Managed E-mail:

Web-based e-mail	$2
POP3 e-mail (help desk for network administrator included)	$3.50
Internet Messaging Access Protocol 4	$5.50
Hosted Microsoft Exchange (help desk for all users included)	$22

Note: Term and volume discounts available and rise with MCI WorldCom transport services.

Range of options

MCI WorldCom will offer the service much the same way that Critical Path has tailored its product suite to the users it sells to directly — avoiding an

See **MCI WorldCom**, page 34

Appian switch dishes bandwidth in small chunks

BY TIM GREENE

If you can get an entire wavelength of bandwidth to your door, how do you break that down into the bite-sized chunks your network applications really want?

Appian Communications says you do it with OSAP 4800, its optical services activation platform being announced this week. It dishes off bandwidth to corporate customers in pieces as small as 64K bit/sec via 10M bit/sec, 100M bit/sec or Gigabit Ethernet ports.

The switch is designed for carriers that make direct fiber connections to customer sites, then sell services at speeds slower than the OC-48 that a single wavelength of light carries to the OSAP 4800. Typically, carriers will place one of the switches in an office park or business high-rise and serve multiple customers off each one.

The device offers customers services that will be simpler to use because hooking up to an OSAP 4800 requires nothing more than an Ethernet port on a corporate router. Traditional services require DSU/CSUs, multiplexers, or frame relay or ATM switches to connect to the WAN.

The device is particularly well-suited for data services but could also be used to carry voice, says Tom Nolle, president of CIMI Corp., a technology assessment firm in Voorhees, N.J.

OSAP 4800 includes T-1 ports to connect to PBXs, and if a customer has IP-voice equipment, that can be passed on to the network as Ethernet traffic, says Appian CEO Mick Scully.

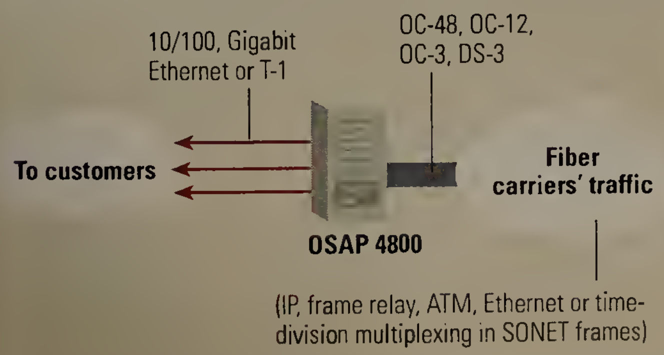
To ensure voice quality, the device prioritizes traffic using a proprietary scheme that includes weighted fair queuing and supports the Multi-protocol Label Switching (MPLS) standard. Corporate routers can set priority for different types of traffic using MPLS, and those MPLS designations can be mapped to whatever protocol is used on the carrier network to ensure the proper quality of service (QoS) is enforced across the service provider's network. OSAP supports time-division multiplexing, frame relay, IP and ATM, Appian says.

Because it will enforce QoS, service providers can use it to deliver burstable services. A customer might buy a guaranteed 1.5M bit/sec but also pay for the ability to use up to 3M bit/sec if the extra bandwidth is available and traffic bursts above the guaranteed 1.5M bit/sec, Scully says.

OSAP 4800 will be available this summer for a base price of $25,000.

Appian's OSAP 4800 delivers Ethernet

Customers plug in to the 10M bit/sec, 100M bit/sec or Gigabit Ethernet ports, which hook directly into carrier fiber links.


10/100, Gigabit Ethernet or T-1
OC-48, OC-12, OC-3, DS-3
To customers
Fiber carriers' traffic
OSAP 4800
(IP, frame relay, ATM, Ethernet or time-division multiplexing in SONET frames)

Bell to add broadband wireless

BY TIM GREENE

Bell Atlantic admits that if you want to sell low-cost, high-bandwidth services to everyone, you can't rely solely on digital subscriber line.

The carrier says it will use broadband wireless to expand the availability and hasten the introduction of high-speed services. The wireless service will be called Infospeed DSL, although it won't actually be based on DSL technology. It will, however, offer similar speeds.

The wireless service is an acknowledgement that not all broadband service needs can be met by DSL. While DSL travels on regular phone lines, some lines do not meet the technical requirements for DSL.

By year-end, customers seeking the carrier's high-speed dedicated access will have the option of fixed, broadband wireless connections instead of asymmetric DSL.

The current Infospeed DSL service offers speeds ranging from 640K bit/sec to 7.1M bit/sec downloads and relies only on regular phone lines turned into high-speed data pipes by DSL technology. Bell Atlantic hasn't yet worked out what speeds the wireless service will support.

To back up its commitment to fixed wireless, Bell Atlantic is investing an undisclosed sum in Radix Wireless, which is developing a wireless system to Bell Atlantic's specifications.

Bell Atlantic says the wireless technology will be used to reach customers whose sites lie beyond the distance limitations of DSL, about three miles from a phone switching office. The carrier says in some cases it may be able to deliver wireless service more quickly than it can roll out DSL, which sometimes requires new wires to be strung and multiple technician visits. ◪

MCI WorldCom,
continued from page 33

all-or-nothing approach and offering a range of options.

The strategy, which Critical Path dubs Allsourcing, offers users the ability to pick from a smorgasbord of services: e-mail gateways, groupware hosting, calendaring and scheduling, integrated fax, security, wireless access and directory services.

www.nwfusion.com

IT'S ALL IN THE MESSAGE

What's "midsourcing?" It's the fine line between keeping services in-house and outsourcing. Find out more about this strategy in Critical Path's white paper.

Learn more about messaging. Sign up for our free e-mail newsletter. DocFinder: 5434

DocFinder 7628 find it online

Critical Path is a 2½-year-old company that has worked itself into a dominant position in the e-mail outsourcing field. Much of its growth has come through eight acquisitions in the past year.

'Boundary services' important

One of the important aspects of Critical Path's offerings is to provide what Peter Charland, its vice president of marketing and sales, calls boundary services. Those include virus scanning, content filtering, distribution lists and delivery of messages to non-e-mail devices.

MCI, before its acquisition by WorldCom, was one of the pioneers of the first generation of service provider electronic messaging systems with its popular MCImail service.

"We still have customers up on MCImail," says Angie Holmes, senior manager of messaging services for MCI WorldCom. The carrier will look to migrate those users to the new managed e-mail offer. ◪

Here's to a faster Web site: the Compaq TaskSmart C-Series server.

Wan Monitor . Daniel Briere and Christine Heckart

EXPECT BIGGER ROLES FOR OPTICAL NETWORKING

Wait, there's one more Oscar: For best performance in a supporting infrastructure role, we nominate the optical networks of next-generation service providers Qwest Communications, Williams Communications, Level 3 Communications, Enron and Broadwing.

Optical networking emerged in 1999 with a promise to provide tremendous savings over traditional SONET architectures. Service providers were able to introduce wavelength services at significantly lower prices, and we now see wavelength services in the backbones of many large ISPs and IXC carriers. Service providers began to question the benefits of SONET rings and warmed to the proposed benefits of dense wave division multiplexing and optical networking. Thus, what began as an interesting promise turned into one of the greatest paradigm shifts in a decade.

Besides cost efficiency, optical networking outperforms SONET because it doesn't have the rigid time-division multiplexer SONET constraints, it handles the bursty characteristics of data traffic more efficiently and it is much more scalable. Rather than overhauling the SONET infrastructure, you can just add transmitters or cards to increase the number of wavelengths.

You've probably heard about "point-and-click" provisioning systems, but SONET made that a daunting task, especially if your provider installed SONET rings. If your service traverses four SONET rings, it requires piecing together four separate segments to deliver a complete end-to-end service.

For the foreseeable future, bandwidth- intensive applications will continue to fuel network growth. E-commerce, video streaming, Web broadcasts, portals, hosting, enterprise resource planning (ERP) and customer relationship management (CRM) will further drive the need for high-speed Internet and network connectivity.

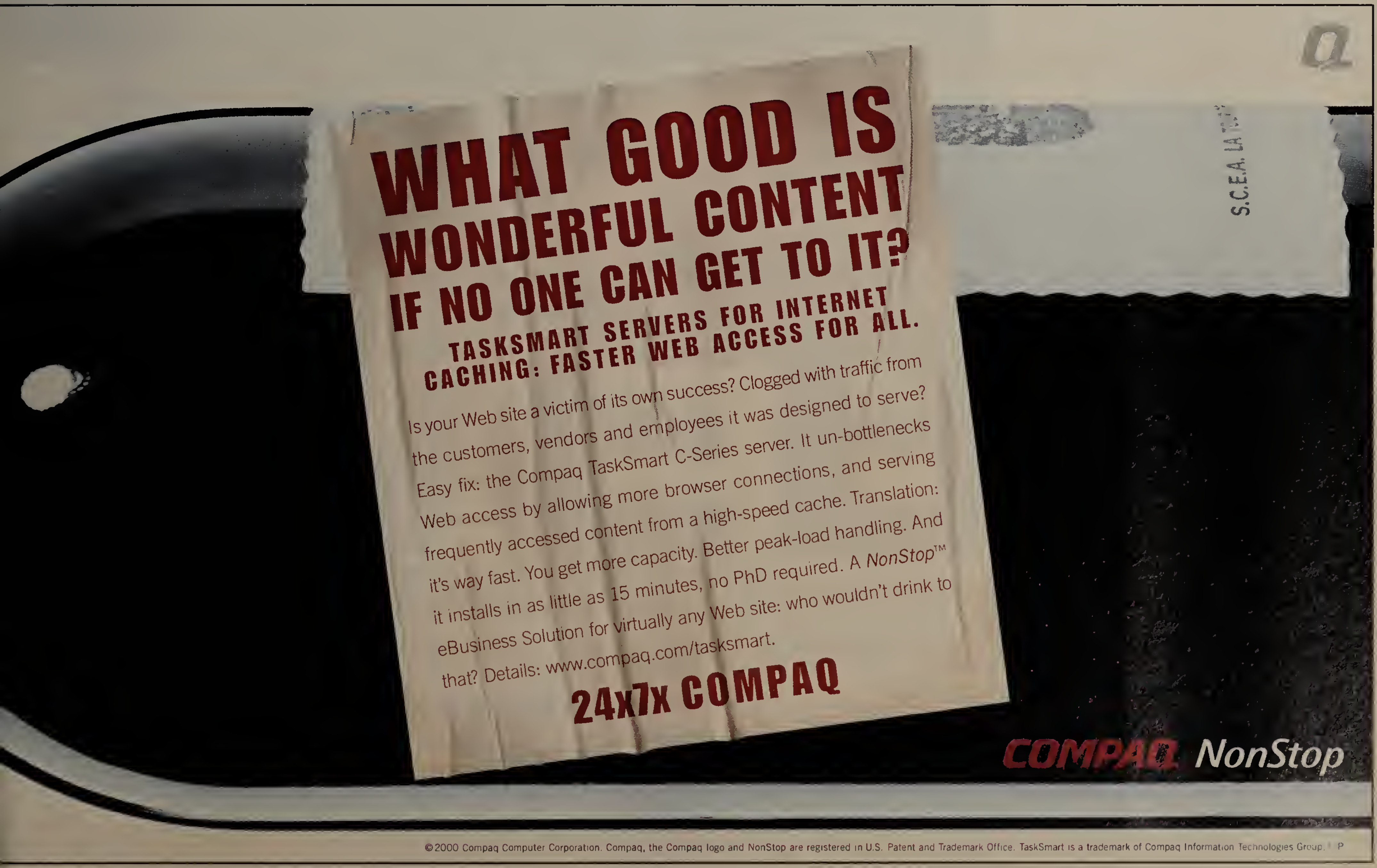
Metropolitan service providers are in the middle of the optical revolution. Vendors and a few new service providers are trying to establish and position themselves with the most viable solution for the metropolitan market.

Application service providers will begin to experience greater demand for hosted applications such as e-commerce, ERP and CRM. This will drive the need for improved reliability, cost-efficient scalability and higher-speed access to their data centers.

Multitenant office buildings will see optical networking come closer to the customer's premise. Last year the hype was around integrated access devices and ATM to the edge for small to mid-size locations; this year should be the optical edge moving into densely populated multitenant buildings and large campus enterprises.

So now that optical networking has received our nomination for the prestigious infrastructure Oscar, will it be destined to be a one-hit wonder of networking? Not at all. Optical networking should shake up the local cost curve of the incumbent local exchange carriers and help bring bandwidth-intensive applications to your desktop.

Briere is CEO and Heckart is president of TeleChoice, a telecommunications consultancy. They can be reached at dbriere@telechoice.com and checkart@ telechoice.com.



WHAT GOOD IS WONDERFUL CONTENT IF NO ONE CAN GET TO IT?

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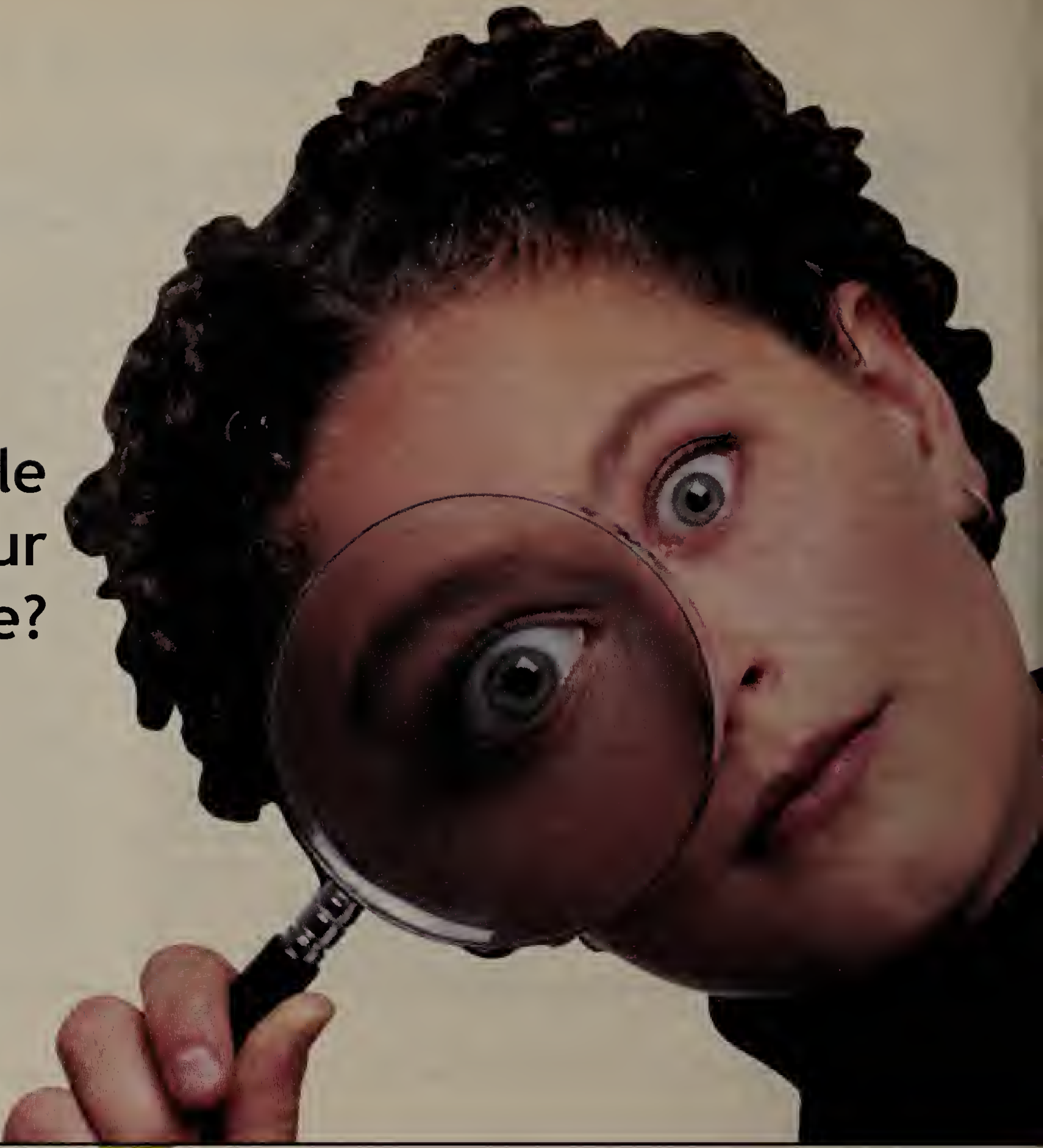

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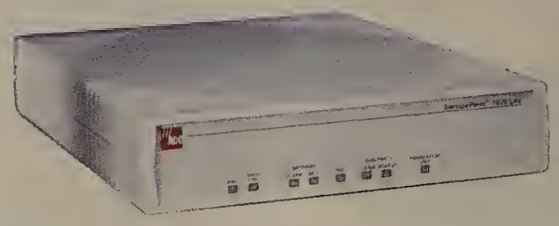

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NetworkWorld white paper

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ArrowPoint, the Web switching pioneer, is already on the job providing intelligence and performance with content smart Web services for some of the world's leading Web hosting, broadband and e-commerce companies. Check out our Web site to see what we can do for you.

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Buy, Build, or BOTH?

Web architecture solutions—and solution providers—abound. Here are some tips for finding the right fit for your business.

BY MARK HOOVER

IN CONSIDERING YOUR WEB ARCHITECTURE, you face an array of options, from building it yourself, to outsourcing it entirely, to a variety of hybrid models. To determine the best approach for your business, many technical, operational, and business issues must be evaluated.

In general, you can break down the considerations into the following areas:

- Physical plant
- Internet access
- Systems platform
- Content and application deployment
- Network/systems management and operations
- User support

Various forms of service providers and services exist to help you out in one or more of these areas. Many providers, generally called co-locators, have built hardened Internet Data Centers throughout the U.S. and, in some cases, globally. These centers typically feature physical security, earthquake and disaster hardening, robust power and cooling, and fire suppression systems. If you don't have such a hardened environment, and you need to house critical e-business applications, you may choose to lease space in an Internet Data Center rather than building the infrastructure yourself.

Complementing the Internet Data Center physical environment, the co-locators have also focused on building out high-capacity and robust Internet access capability. They have multiple OC-3cs and OC-12cs between their centers and similar speed connections to multiple public and private peering points. Just about all of them have plans to upgrade to OC-48 and beyond.

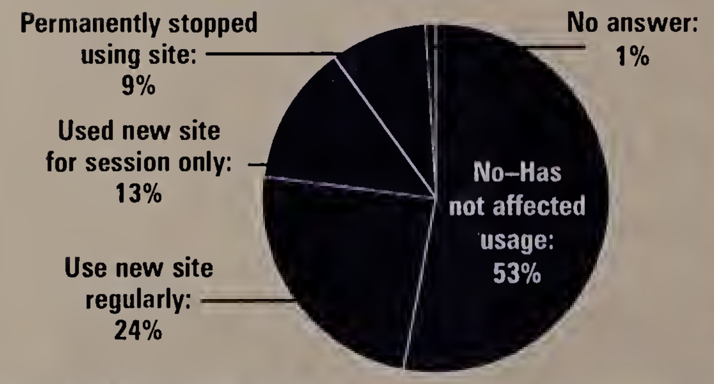
However, the cost of provisioning such bandwidth to your own sites could be prohibitive. It may be much more economical to pay for a shared portion of the bandwidth the centers have put into place. You can negotiate levels of both guaranteed bandwidth plus priority access to "excess" bandwidth to help you handle occasional periods of peak load. As your needs grow, you can often modify your bandwidth agreement with the co-locator overnight, whereas it might take you weeks or months to arrange for similar increases of bandwidth into your own sites.

Lastly, the co-locator's multiple peering agreements give you fast, low-latency access to most of the major Internet backbone providers—this often allows your customers' traffic to bypass the public peering points (MAE East or MAE West), which are often congested. Such peering arrangements are not an option for you if you use ISP links directly into your own sites.

YOUR APPLICATION ENVIRONMENT

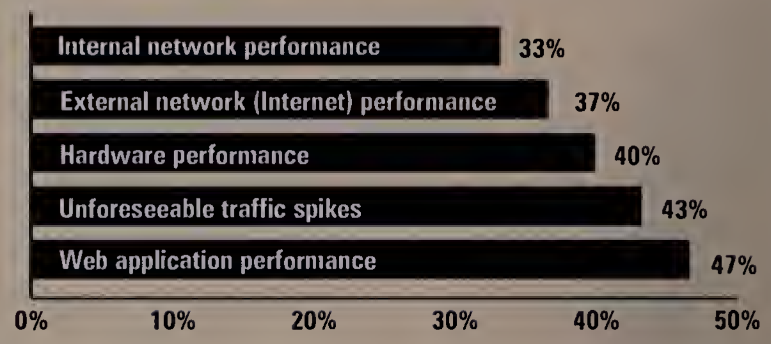
For the reasons outlined above, deploying some or all of your application at a co-locator site makes sense in a lot of situations, even if you have the in-house capability to design and manage your own applications. At this point, the questions become:

YOU'VE GOT TO GET THAT SITE RIGHT!



Consumers Find Alternative Sites When Problems Occur

Source: Jupiter/NFO Consumer Survey



Most Commonly Reported Causes of Failure

Source: Jupiter Executive Survey

1. How much of your application delivery environment to deploy at the co-locator?
2. What, if any, services to buy from the co-locator?

Answering the first question can be a complex exercise. For simplicity, let's consider the components of your application delivery environment to be Web servers (for communications and static content delivery), application servers (for dynamic application delivery), and databases.

The deployment of Web servers or caches at the co-locator, possibly on a global basis, is generally a good idea. If even just 25% of the requests to your site are for static HTML-based Web pages, servers at the co-locator can deliver that content via the co-locator's high-speed Internet links, providing you both good customer satisfaction (due to fast responses) and a reduction in bandwidth requirements for the dynamic application traffic that passes through the co-location site back to your site.

The wisdom of deploying application servers and databases at the co-locator depends largely on the e-business uniqueness of your application. How many of the users accessing the application are doing it over an IP network? For a traditional brick-and-mortar company, using the Internet as a new medium to interact with customers, this may be a low percentage. Existing telephony call centers and teller-supported branch offices may still support the majority of customer interactions. If that is the case, the main objective of the Web-oriented technology is to provide an efficient portal into the existing back-end systems, and the actual deployment of those systems at a co-locator may make no sense. In this case, you want to make sure that you have a reliable and properly scaled private connection from the co-locator into your site to handle the dynamic application traffic that passes through to you.

On the other hand, if your business is largely or purely e-business, you may want to deploy your application servers and databases at the co-locator to take advantage of both the robust environment they have created and some of their support services.

That brings us to the second question. If your key assets are deployed at the co-locator, what, if any, of the services they offer should you use? The choices depend on the co-locator, but they usually include platform (operating system), systems administration, database maintenance, data backup and recovery, security architecture and deployment, and server load balancing services.

Generally, co-locators don't offer to run your applications for you. That differentiates co-locators from Application Service Providers (ASPs)—most of whom co-locate their assets, by the way, from co-locators. Application management is a very complex function and because each deployment is a little different, it is hard for co-locators to achieve efficiencies of scale. Therefore, they usually leave application management to you.

WHERE THE LINES BLUR

Even if co-locators offered application management services, most of you shouldn't buy into them. You may not have enough internal resources to understand routing, virtual private network (VPN) technologies, server load balancing, firewalling, and Unix or NT systems administration. Other people can handle those things quite well. But no one understands your applications and customers better than you. This is where the lines between technology and business blur.

For those functions you decide to outsource to the co-locator, it is a good idea to outsource the management of those functions as well, as long as they are infrastructural. Don't turn over any customer or user support to the co-locator; they just won't have the same sense of mission and quality that your own people will. Instead, you'll want to establish clear Service Level Agreements (SLAs) and escalation procedures so that you can manage the co-locator just like you would an internal organization.

The good news is that there is very good help out there that you can tap into. The bad news is that it takes work on your part to take good advantage of that help. ❧

Mark Hoover is the president of Acuitive, Inc., a consulting company focused on helping networking equipment vendors and service providers develop and market innovative products and services. Prior to founding Acuitive, Hoover worked at AT&T Bell Labs, SynOptics, and Bay Networks.

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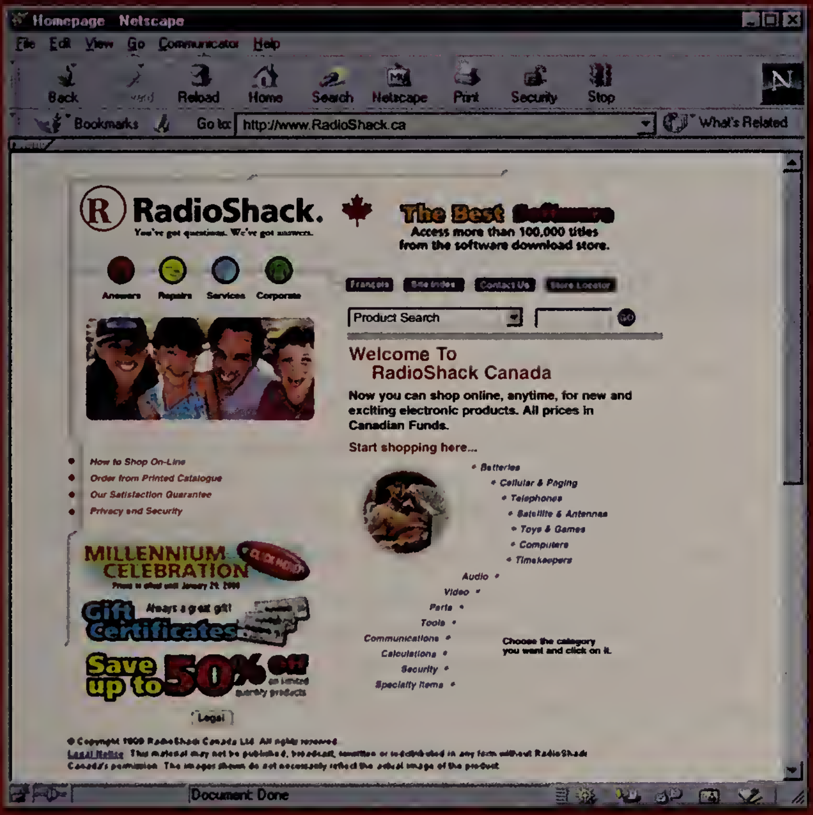

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WIDE OPEN, Airtight

How open, yet still safe and secure, can you expect your e-business system to be? Read on to find out the system components that are likely to need your closest attention regarding security.

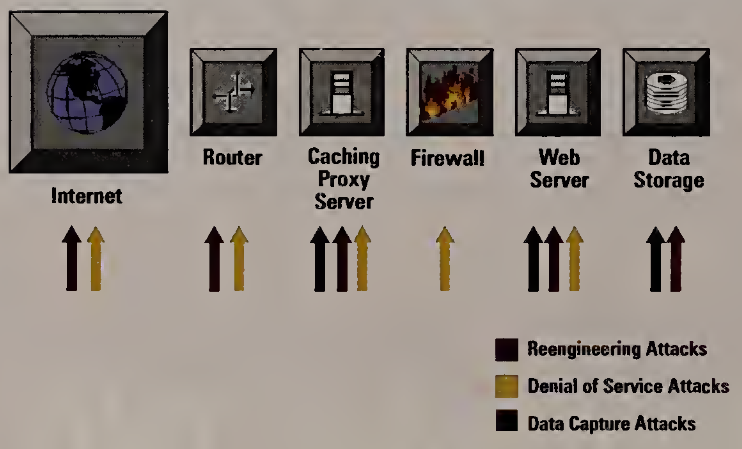
BY JAMES BARTHOLD

AT THE HEART OF E-BUSINESS IS THE NOTION THAT ONE COMPANY opens itself up like never before, both to customers and to business partners. This is a great notion for information sharing, but a scary one from a security perspective.

The entire business structure of most dot.com companies is dependent on Internet connectivity. E-commerce sites are becoming more crucial to traditional businesses, with more being integrated into existing critical business systems and processes. Yet, e-commerce Web site design is still in its infancy; the most mature sites are little more than five years old.

To develop a security strategy, all e-businesses need a thorough understanding of their site's technology, their business assets, and the threats to those assets. Without this understanding, companies cannot address security concerns, nor can they create effective solutions to protect them. All aspects of the company's infrastructure must be examined.

Hacker Attack Types on E-commerce Web Site Infrastructure



Developing an effective security model is as much a business review as a technology review. Overprotecting a Web site can make it extremely difficult to navigate, and can dramatically impact the site's ability to handle a large number of users. Security infrastructure is expensive, and in the increasingly competitive world of dot.com companies, overspending on security can hamper stock performance and do more damage to the company's long-term prospects than any security breech.

A GOOD DEFENSE

One of the most effective ways to develop a good defense is to examine the most likely threats to a Web site. Security experts list three primary types of attacks on Web systems: Data capture, reengineering, and denial of service (DoS). These three types of attacks focus on different parts of Web site infrastructure, and even the most well designed sites may be vulnerable to one or more of them.

Firewalls are crucial to protecting against all attacks. Any site not protected by a firewall is not meeting current standards of practice. Firewalls are no longer the endpoint for Web security, but instead serve as the starting point. Authentication systems, encryption engines, certificate servers, and intrusion detection

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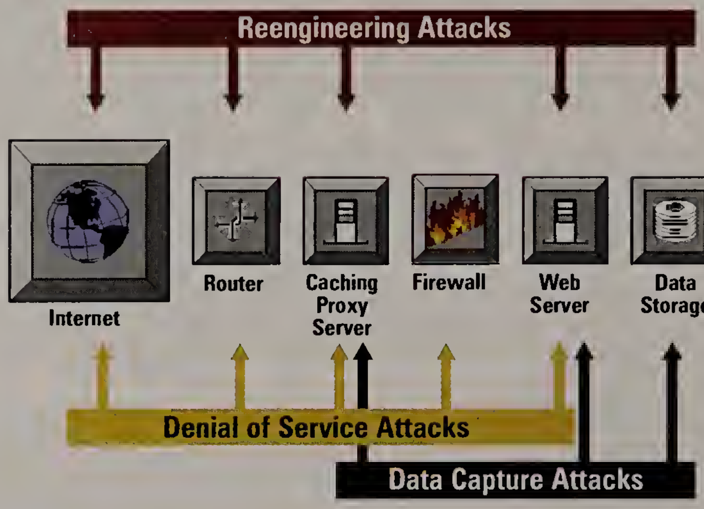

systems all work together to secure e-commerce sites.

Data capture attacks are what most people fear. In this form of attack the computer criminals find a way to download critical information such as credit card numbers or other financial data. Because there is no need to alter the data in any way, the attack may remain forever unknown without intrusion detection systems. An attacker typically must gain root level or superuser access to the Web servers that host the site before this type of information can be gained. Staying current on the vulnerabilities of the host server's operating system is key. CERT (www.cert.org) and the Computer Incident Advisory Capability (CIAC), www.ciac.llnl.gov, are good sources of this information.

Active audit tools are an important part of securing against this type of attack. They can scan a host server looking for known weaknesses, and report them back in an easy-to-understand format. This process should be repeated regularly, similar to virus scanning. The tools also need to be updated to look for the latest vulnerabilities.

The best protection against data capture attacks is provided by encryption and authentication systems. All financial information and other critical data should be stored only in encrypted form and typically on another server not directly accessed by Web users. If returning users are given the option of storing personal data, then a strong form of authentication should be used. Digital certificates, not cookies, should be used for this purpose. Certificates are also necessary for enabling dedicated encrypted SSL (secure sockets layer) sessions.

ALTERED CONTENT

Reengineering attacks seek to damage the company by intentionally altering the site's content. This attack is particularly insidious as it uses the company's own systems to damage the company's reputation. Most of these attacks are short-lived because it is their intention to be discovered, thus giving the affected site an opportunity to repair the content or down the site until this has been accomplished. However, even extremely short outages may prove costly if the altered content is posted elsewhere on the Internet or published in other media. These attacks may be for political or propagandistic reasons and may have severe economic consequences by driving away customers or driving the company's stock price down.

Reengineering attacks are increasingly popular and on any given week, 20 or 30 sites may have their content altered. Intrusion detection systems are a solid defense against these attacks, but attention must be paid to all areas where Web site information is stored. Increasingly, Web-caching servers are being attacked because they are often placed outside of secured networks. These servers don't directly host the site but simply cache site pages or information. As such, if this data is altered then the Web site's appearance is altered.

FLOODING SITES

The final attack type, denial of service or DoS, can also be extremely damaging to a company by preventing customers from using a site, or by driving the company's stock price down. eBay suffered a drop in its stock price the day it was down for two hours. It is difficult to say if this was the sole reason for the stock's drop, but the timing suggests that this is the likely cause.

Unfortunately, the bar has been raised on security with the advent of new, extremely powerful DoS attacks. Most Web sites are very vulnerable to DoS attacks, because they go after infrastructure components that were previously overlooked in security evaluations. In the attacks that occurred during the second week of February, the Internet connections leading into the Web sites were flooded with traffic, making it impossible for real customers to access the sites.

Firewalls are no longer the endpoint for Web security, but instead serve as the starting point.

The sad truth is that all components comprising a Web site now need protection, including basic pieces of the site's infrastructure, such as the site's connection to the Internet itself. Careful attention should be paid to the following assets—network connectivity, data storage, the Web servers' operating system, caching servers, network systems such as routers, and load balancing systems. The site's security should also be continuously updated just as most systems managers now update virus protection software. ❧

James Barthold is an independent consultant in Stow, Mass.

BY JOHANNA AMBROSIO

Hitting the Peaks

Your customers will disappear into thin air if your Web site runs out of oxygen at peak traffic times. Good capacity planning requires near-constant vigilance.

"Stressed out!"

Capacity planning for a high-performance Web site is kind of like building a house: Just when you think you're all done, your mother-in-law decides to move in and you need to add another room.

Likewise, e-commerce pioneers have discovered that the job of capacity planning is never really over. It takes near-constant vigilance to track the level of site activity and your visitors' experiences on the site, and then add more servers or bandwidth to get the job done.

Consider this tale from Eastman Kodak Co., in Rochester, N.Y. The company's Web site is five years old, and "we experience peaks and valleys like everyone does," says Steve Kristy, director of technology and cool Web stuff (yes, that's really his title!). And while Kodak tries to run its site at no more than 50% capacity to handle the spikes that come along, even its experienced crew can be caught off-guard.

It happened during the Woodstock festival held last year, because of a business-development deal. Kodak and the festival organizers agreed to have a link from the Woodstock site to Kodak's. In exchange, Kodak sent a dozen photographers with digital cameras to take photos at the festival and post them on Woodstock's site.

"We flat-lined our server," Kristy recalls, "because we had so much traffic. We had people working through the weekend to add additional server capacity." Although the site didn't actually go down, performance did suffer.

"We were caught off-guard," Kristy says. "The deal seemed harmless enough; we just didn't anticipate the kind of traffic it brought." The lesson learned: "Be careful to coordinate with any business deals we're making."

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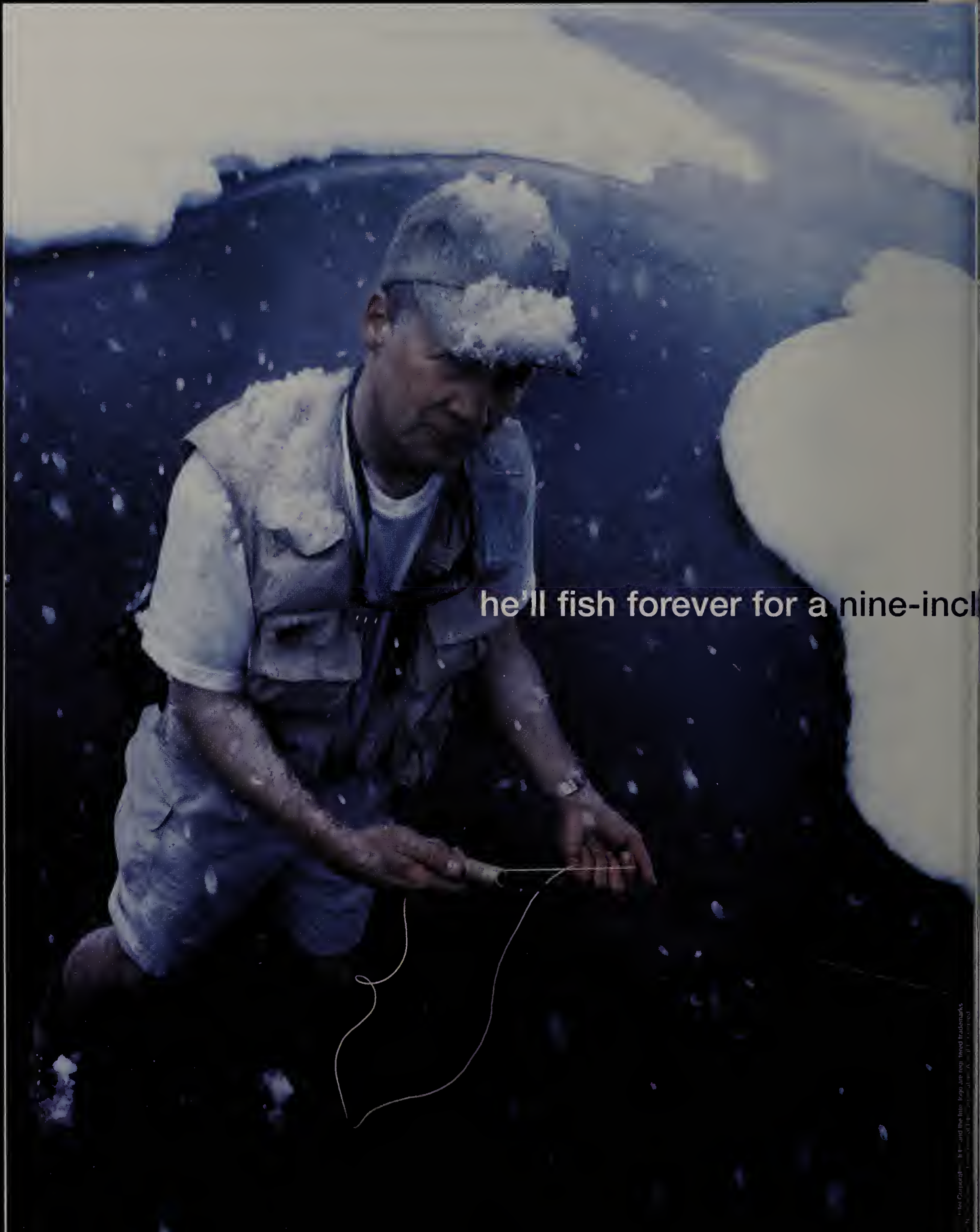
Fred Johnson, CIO of FTD.com, Downers Grove, Illinois.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The Web "is our store. If we're not up, we're not serving our customers."

–Fred Johnson, CIO of FTD.com

PAYING THE FIDDLER

If you're adding a Web site to your company's dance card, you'll need to think long and hard about these kinds of capacity issues. They're all tied to what you want your site to be and do for the company, what kind of experience you want your visitors to have while at the site, how large the site is, and what kinds of information or transactions will be provided and performed on the site. A Web presence with static information has vastly different capacity needs than does a site that's customized on-the-fly, or one that does actual e-commerce transactions.

It's also critical to decide how key the site is, really, to the present or future success of the company. If it's an additional means of providing information, that's one thing. If it's the do-or-die mechanism that will make or break your company's financials into the future, you'll probably want to make sure it never fails.

Also to be factored into the equation is what kind of information you're providing or selling. Will visitors be downloading huge files (software or streaming video)? Or will customers be manipulating digital photos, as they do on Kodak's site?

Once these questions have been answered, it's time to start thinking about some other issues. How many visitors will your site garner each day? What about six months from now? To gauge the traffic patterns, check around at competing sites and at companies that track site performance, such as MediaMetrix.com or Netratings.com.

Another series of questions to answer: What level of performance is optimal and/or acceptable for your customers? Day traders on Schwab's site may have one set of expectations, while someone looking up research information on a reference site might have another. It's important to know what your customers expect from you – and to design your site to meet or exceed those expectations.

According to a recent study from New York City-based Jupiter Communications Inc., "Customers have a low tolerance for site failure, and even the perception of instability can erode their loyalty." Out of the 2,369 consumers that Jupiter surveyed, 46% said they'd leave a site due to a technical or performance problem. Some 24% of those users said they'd return to the site, but only after establishing a relationship with a competitor, and 9% said they would completely abandon the first site.

So, for a site that is critical to the well-being of your company, failure is not an option. Experts advise implementing a dedicated T-1 or T-3 line, at a minimum, for the site. The temptation at most firms in site start-up mode is to share the site's pipe with other applications: internal users needing Internet access, for example. That sharing scenario might suffice if you're expecting low site volumes for a very long time, but it probably won't do if you're expecting 10,000 site visitors each day.

You'll also need to decide if you want to add some IP-oriented bells-and-whistles to your network setup: the ability to automatically move visitors, as they come in, to whichever server is least busy, for example. And if you're expecting a surge for a special event, you'll need to decide whether to handle that excess capacity yourself or to outsource it to an outside firm for the duration of the special event.

Other key technologies are log-analysis software, to determine what your traffic actually is, as well as peak periods during the day or peak days during the week, and a suite of testing tools to see about the performance of your company's network, hardware, and Web applications. Jupiter's report suggests adding a dedicated quality assurance team to the usual Web development effort, to make sure that the capacity-planning and other issues are fully addressed before the site goes live.

In addition to the internal load-testing tools you can buy from a raft of traditional networking and e-commerce-oriented testing vendors, there are outside services that will perform the tests for you.

THE OUTSOURCING ROUTE

Even if you go the outsourcing route, there are things you can and should do to make sure your site is accessible around-the-clock. FTD.com, for one, is working with an outsourcing organization that has guaranteed 99.95% site uptime. If for any reason that guarantee is not met, FTD.com receives a penalty fee. "That's a fee I hope never to collect," says FTD.com CIO Fred Johnson.

FTD.com decided to outsource its back-end operations so that the FTD.com development team could focus on site navigation, customer care, and other customer-oriented issues. FTD.com worries about the "what" of the site, letting its outsourcer worry about the "how."

Even so, Johnson explains, "we always look" for multiple routers and long-distance providers so there is more than one entry point into the site. It's critical that FTD developers can access their Web servers no matter where they're located.

The Web "is our store," Johnson says. "If we're not up, we're not serving our customers." ❧

Johanna Ambrosio is a freelance writer based in Marlboro, Mass. She's written about business and computers for almost 20 years.

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Secrets of the e-biz stars

Fidelity and Boise Cascade focus on performance, scalability, and reliability.

BY DOUG BARNEY

Success in e-business takes technology, something decent to sell, and of course, enough cash to make it all happen. But all the money in the world won't buy e-biz success—unless your company has the smarts to back it up with a solid, reliable, scaleable Web network infrastructure.

To get some star advice, we interviewed a couple of winners in the e-biz game to find out how they built Web architectures and e-business networks that can go the distance.

A HAILE CHARGED NETWORK

Fidelity Investments Systems Co. of Boston clearly has its e-biz act together, and much of the credit goes to Don Haile (pronounced high-ly), president and CIO. Haile cut his teeth running IBM's Network Hardware Division, and now applies his networking prowess to keeping Fidelity's online investment operations running smoothly.

Even though the Fidelity network has enormous capacity, Haile is always thinking, planning for more and more customers, more and more hits, and more and more pages. And he's got 30,000 already.

Currently the Fidelity.com site handles the equivalent of 100 million phone inquiries per day, a measurement Haile and his crew use rather than the less-telling hits or page views. And with thousands registering for the site every working day, Haile knows traffic will only go up.

Fidelity begins with a strong data infrastructure. The company holds much of its customer information in IBM mainframes equipped with CICS for transaction processing, and running Oracle, DB2, and IDMS databases. To get the data closer to the customers, as well as offer backup, the company has three data centers, one in Marlboro, Mass., another in Merrimack, N.H., and the third in Dallas. "If we have a problem in one site, we can switch all the traffic," Haile explains.

Donald Haile, president/CIO, Fidelity Investments Systems Company

The sites are all tied together by a robust batch of DS-3 (the equivalent of 28 T-1 lines) and OC-3 (155 Mbps or more than 150 T-1s) lines. You're not likely to get too bogged down with these kinds of connections.

Web serving is handled by hundreds of Sun Solaris-based servers running Netscape's Web server software, and a smaller number of NT boxes running Microsoft's Internet Information Server (IIS). These servers route URLs to the proper locations, such as less busy boxes, and are equipped with caching devices to speed access.

Fidelity is hoping to consolidate around a single Web server platform, and is interested in Windows 2000 mainly for its added reliability.

Many static (which in Haile parlance means updated every 10 or 15 minutes) pages, and often requested pages, "are stored as close to the customer as possible," Haile explains. For instance, Exodus Communications, Santa Clara, Calif., outsources many of

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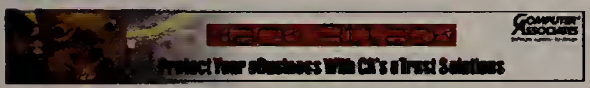

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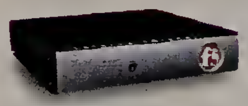

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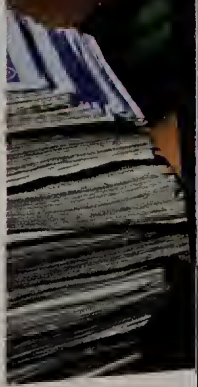

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From Left, Terry Kallen, Joseph Annis, and Ruben Areyzaga at Boise Cascade in the Schaumburg Office Products facility.

these pages for Fidelity. Exodus even hosts Fidelity content at a site in Herndon, Va., so it can be close to America Online, Haile says.

The more specialized and proprietary information, such as personal portfolio information, is retrieved from the mainframes in one of the three data centers.

To gain more backup and move data ever closer to the customers, Fidelity is looking for more outsourcing partners.

ALWAYS ON GUARD

And to keep it all secure, Fidelity has firewalls everywhere. "All data coming in is analyzed. We are always on guard for hackers," Haile says. And to make sure everything runs smoothly, Fidelity relies upon a strong network and systems management architecture, including spoofing customers to check on response time.

But when it comes to a growing site, a CIO's work is never done. "We are constantly looking at [usage] trends and what our mainframe MIPs requirements are, the bandwidth requirements to get into the mainframes, and bandwidth to our ISPs," Haile says.

If you want to duplicate any of Fidelity's success, then take Haile's advice: Figure out who is going to win the battles over operating systems and Web servers, and pick a vendor that will be around for the long haul. Also, choose great development tools, and figure out how to manage the growth of your site, while remaining responsive to your customers.

BOISE CASCADE GOES B2B

When most of us think of business-to-business (B2B), we think of perhaps interacting with tens or maybe hundreds of customers. When office products supplier Boise Cascade Office Products of Boise, Idaho, thinks of B2B, they think about 110,000 users and about a million dollars in revenue a day. That's a lot of business going to a lot of businesses.

The company's site, live since January 3, 1997, currently handles customers in the U.S., U.K., and Australia. It is geared toward large corporate customers, such as AT&T and Citibank, and pulls in more than a million dollars a day, says Terry Kallen, manager, Emerging Technologies.

With so many customers, security is obviously a prime concern. So before customers can order anything, they must log into the digital certificate protected site. "The whole site is entirely SSL-based," explains Ruben K. Areyzaga, Unix system administrator. And once customers gain permission to access the Boise-hosted network, they still must pass through one of the many firewalls that keep the data safe, Areyzaga says.

Once inside, customers find that the site can be personalized to suit their style of browsing or order history. For instance, options that are not applicable can be hidden, and fields can be labeled with terms that match your own business terminology.

BULKING UP

Like Fidelity, Boise Cascade is focused on performance, scalability, and reliability. Gaining these attributes is far from simple. In fact, it requires work in a number of different areas.

For starters, the network that supports the system is entirely switch-based, which means data moves fast. Also, the Cisco 6500-based network has no single point of failure, Areyzaga says.

Access to the network is handled by multiple T-1s, and for now a single ISP. However, the company is looking to hook up with multiple ISPs to make the site more available. Once that is in place, Boise can load balance between the various ISPs.

Once inside the Boise firewall, customers find themselves interacting with any of the five Sun Solaris-based servers running Netscape server software. Right now each multiprocessor-equipped box handles both Web and application serving. But an upgrade is coming this spring that will double the number of servers and will separate the Web and application functions.

To keep each server from getting overwhelmed, Boise uses Cisco's Local Director to do front-end load balancing onto the Web servers.

Boise's already busy site is expected to get busier over the coming months and years, a problem the team will tackle by increasing the number of Solaris servers, making each more specialized, supporting multiple ISPs, adding QoS (Quality of Service), increasing load balancing, and adding redundant local power grids and a generator.

Finally, the Boise Web team has a few words of advice. "Define your business goals first—what kind of availability do you need. Then be prepared to spend the funds to meet those demands," says Joseph V. Annis, lead network design architect. ❧

Doug Barney is executive editor of news for NetworkWorld.

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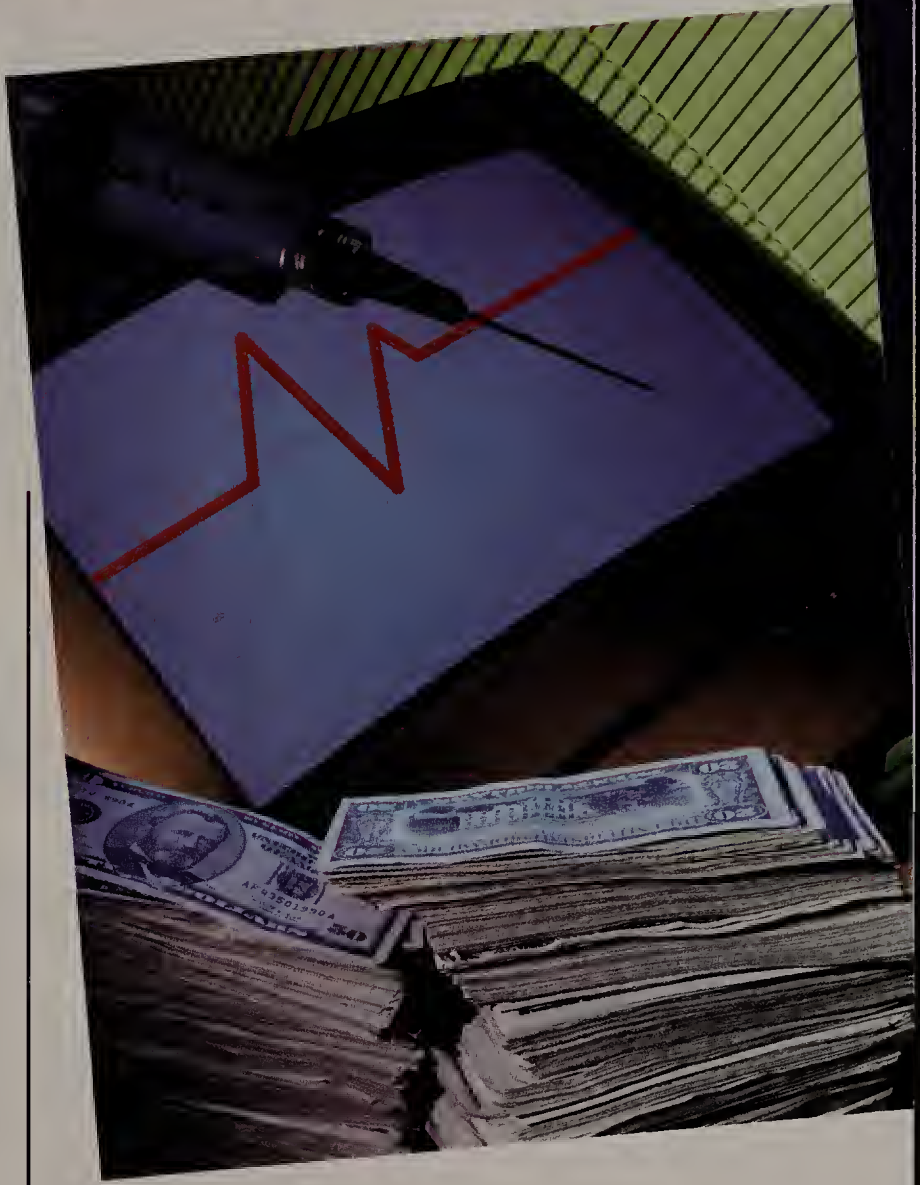

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e-Commerce Pressure Points

Knowing the available solutions to Web trouble spots can help keep the pressure off.

BY LENNY LIEBMANN

Like the Chinese art of acupuncture, maintaining the health of high-traffic e-commerce sites requires a good understanding of "pressure points." If a problem occurs at any of these critical points, performance and/or reliability can suffer. Here, then, is a brief overview of the solutions the industry is currently offering for each potential Web trouble spot.

Database Optimization and Connection Pooling

Back-end databases pose one of the most common threats to e-commerce performance—especially since older databases aren't designed to handle the thousands of queries-per-second that a busy site can generate. Newer databases address this challenge by using different approaches to read/write execution and data caching. "Connection pooling" tools and techniques also allow multiple e-commerce application actions to use the same database session—further reducing stress on the back end.

Web Application and File Servers

This middle layer between a site's 'Net-facing Web servers and its back-end database servers can also become a bottleneck—if any individual application component becomes overburdened or if files simply can't be served up fast enough. Vendors are addressing this problem with specialized hardware and software solutions designed to ensure efficient application object execution and accelerate file access.

LAN Switching

Traffic between Web servers and middle-tier servers can quickly saturate a site's local switching capacity, especially as the number of those servers grows. That's why hardware vendors are starting to offer new high-speed switching solutions that provide gigabit Ethernet uplinks to eliminate congestion as content streams from multiple servers are aggregated.

Web Servers

As site traffic escalates, the best solution to ensure the ability to serve large numbers of users is often brute force: Just add more boxes. To make it easier to add these machines, systems vendors are offering their customers specialized plug-and-play Web server appliances that offer lower cost and less configuration hassles than the conventional "roll-your-own" PC-based approach. These appliances are often rack-mountable and offer a smaller form factor than their PC equivalents—which can be particularly important in a co-location setting where space is money.

Encryption Accelerators

While the encryption of site traffic using standards such as SSL and IPsec is often an absolute requirement for security, the actual execution of such encryption tasks can be a tremendous burden on server CPUs. Vendors are responding with specialized encryption hardware that offloads these tasks onto entirely separate devices or add-on boards for existing servers.

Load Balancers

Load balancers have become the real workhorses of Web site scalability. Originally, their job was just to distribute requests to Web servers so that no individual CPU would become overburdened. Over the past few years, however, load balancers have increased dramatically in their sophistication. Most can now not only check

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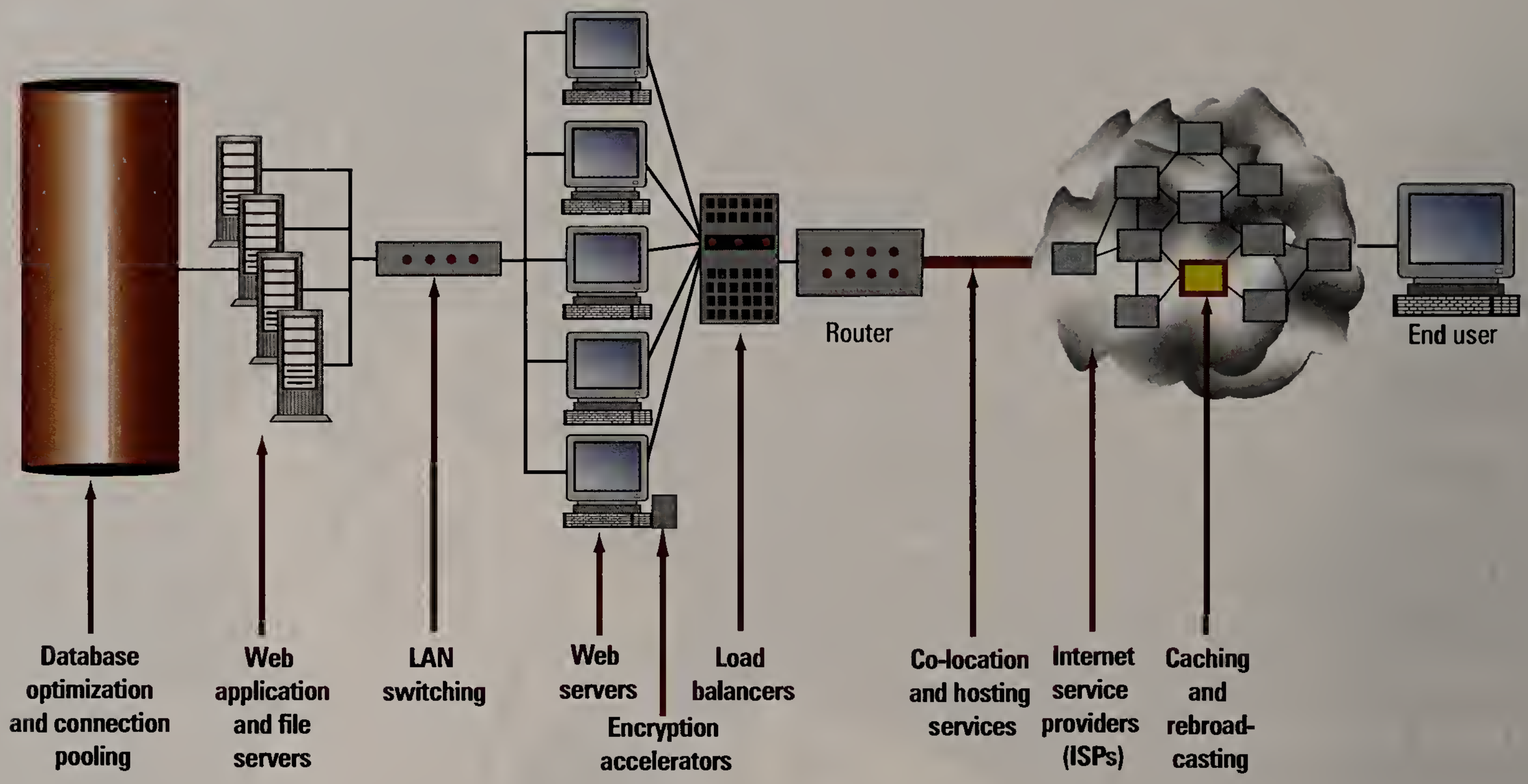
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End user
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LAN switching
Web servers
Encryption accelerators
Load balancers
Co-location and hosting services
Internet service providers (ISPs)
Caching and rebroadcasting

the status of the Web server to which they are directly connected, but also the health of any resources behind those servers as well —so that session performance doesn't get bogged down by slow application or file servers. Today's load balancers can also examine end-user "cookies" in any data stream so that customers who have paid for premium services or who are about to hit the "buy" button can be given access to faster servers than other site visitors.

Co-location and Hosting Services

One of the biggest constraints on Web site performance is obviously the size of that site's Internet connection. But it usually doesn't make economic sense to buy a big enough "pipe" to handle peak load—only to see all that capacity wasted during periods of off-peak demand.

Co-location or hosting service providers can address this problem by giving customers the ability to leverage the massive 'Net bandwidth they can offer, and by allowing them some flexibility in how and when they ratchet that bandwidth up and down. Such services can also offer better proximity to primary network access points (NAPs), which further enhances end-to-end site performance, as well as multiple connections to multiple "tier 1" provider backbones to help route around routing problems that any individual carrier may experience.

Internet Service Providers (ISPs)

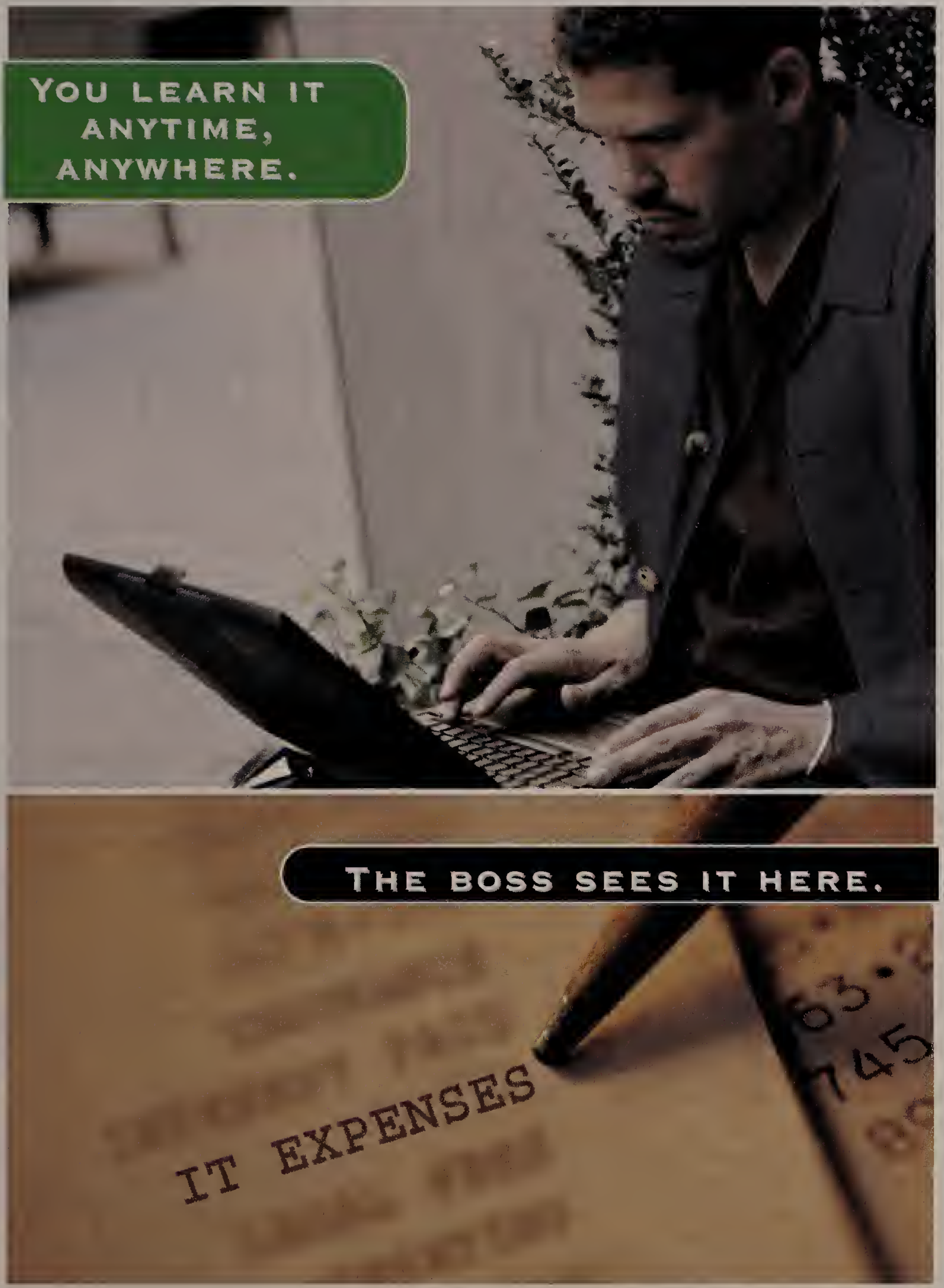
All ISPs are not created equal. Successful managers of successful sites usually spend time querying potential ISPs about their network infrastructure and management capabilities. They also do their own "trace-routes" on that infrastructure to check on things like routing stability and inter-ISP peering. In fact, some sites are now taking advantage of new, specialized peering services that proactively route around potential Internet bottlenecks.

Caching and Rebroadcasting

Another way to deal with congestion on the Internet itself—which is, of course, beyond the control of site managers—is to use a content caching service. Such services keep static content such as graphics and nondynamic pages on servers that are distributed around the country and/or around the world. Because this content is closer to end users, they enjoy faster page loads and more reliable service. Rebroadcasting provides similar capabilities for live streaming media—with the added benefit of reducing bandwidth consumption at the site itself (since the site only needs to send out as many "streams" as there are rebroadcasting servers, instead of one stream for each active end user).

The above list doesn't cover every single factor that can impede an e-commerce site's performance. Overuse of graphics or poorly written scripts, for example, can also bog down page loading speeds. But these are the key infrastructure issues that high traffic sites are confronting and that vendors are attempting to address. As use of the Web continues to grow and evolve, there's no doubt that new problems—and new solutions—will continue to emerge.

Lenny Liebmann is a Highlands, N.J.-based consultant and writer specializing in the technology and business of networking and e-commerce.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Analyst to Web Managers:

Proceed, but with Caution

IDC's Elisabeth Rainge says Web-based management has improved, but applications still need to open up.

BY MARK BAARD

Last year, Framingham, Mass.-based research firm International Data Corp. (IDC) assessed the state of Web management for legacy systems in an aptly titled report, "Integrating Legacy and Web-based Management." For the report, IDC analysts Elisabeth Rainge and Richard Villars interviewed early Web management adopters and profiled Web-based products from 3Com, Cabletron, Hewlett-Packard, Nortel, and Cisco Systems.

The report advises managers to use Web technologies that deliver critical management information to business unit managers and customers, and to pay close attention to managing security in increasingly open environments. And, the report says, any enterprise manager evaluating a Web management solution should "look to see if the management supplier leverages smart service [functions] to improve the maintenance of its own product."

Rainge and Villars assert that companies must find "product and service vendors with experience in the design and deployment of Web technologies needed to deliver promised solutions." That category, they say, has grown to include both legacy system providers and many new software developers. Rainge, who specializes in enterprise management technologies for IDC, spoke to us recently.

Q *"Integrating" recommends deploying quick Web-based solutions as a way to address limited problems. Why not build more comprehensive solutions for the whole enterprise?*

A The browser can be a great take-away tactical tool, but managers have to be careful when making the jump to strategic uses. Web-based management software is evolving very quickly. In many cases, users can take advantage of the fact that the technology is relatively inexpensive, and avoid investing too heavily in solutions that claim to do everything.

Q *What are the real benefits that Web-based management systems bring to legacy systems?*

A Perhaps the most significant advantage is the ability to use the most appropriate server technology while maintaining a consistent, browser-based GUI. For in-house and commercial developers, Web-based management applications can really speed their time to market. This allows them to focus more time on the back-end, on the server level, where much of their data can be more effectively managed.

Q *When it comes to security, how much is enough?*

A Management and security represent a classic chicken-and-egg scenario. Fortunately for managers, e-business activity and innovation are driving an increase in security between browsers and servers. And the pace of innovation is strong enough that management can benefit without having to develop the security expertise itself.

Q *You say production environments, with their need for excruciating detail, will be late adopters of Web management solutions. What has to change to make Web management more viable?*

A Advances in browser technology itself—a good portion of which has happened in the past year or so—is the answer. Web-based management two years ago was working off the publishing model. Since then, it has become more of an actual console, with real-time information and administrative control. However, there are still some improvements to be made. The major step will be for the application owners to become more comfortable with opening up their applications to external users. ~

Mark Baard is a freelance technology writer in Milton, Mass.

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Briefs

Wingra Technologies in June will ship a major upgrade to its NetJunction message switch, which is used by large companies such as TimeWarner and British Aerospace to integrate different e-mail and groupware systems.

NetJunction 5.0 provides Windows NT-based access to Lotus cc:Mail and Novell GroupWise systems instead of DOS-based access, which allows for remote management. The latest version also features enhanced directory synchronization, faster performance for Internet mail and supports Lotus Notes 5.0. NetJunction 5.0 runs on Hewlett-Packard Unix servers and prices start at $50,000.

Wingra: www.wingra.com

The Interactive Financial Exchange Forum, the Alexandria, Va., organization seeking to develop XML-based specifications for online billing and presentation, has released IFX 1.0.1 for public review at www.ifxforum.org. The forum, whose board includes representatives from AT&T, Bank of America, CheckFree, Citigroup, EDS and IBM, wants to finalize the online billing specification by April 24.

Later this month, **Sun Microsystems** will ship Forte Fusion 2.0, server software that uses XML to let Web applications exchange data with back-end systems. New features include support for Extensible Stylesheet Language Transformation, which will let Forte Fusion translate between different XML dialects. Also, performance has been tweaked to run up to a million active processes at once, according to Sun.

Sun: www.sun.com/forte

Directory integration key for users

Unifying directories will lower costs, support e-commerce, according to industry players.

BY JOHN FONTANA

Before IT executives can realize the benefits of an enterprise directory infrastructure, they will have to clean up their glut of directories and devise a plan to integrate what remains into a logical whole.

Those conclusions were reached as part of *Network World's* recent eight-city "Making Sense of Directories" seminar series.

Banyan's Patrick O'Kane, Novell's Samm DiStasio, Burton Group's Gary Rowe and Microsoft's Peter Houston debate the merits of net directories.

The bright side is the effort will foster cost savings, streamline user and application management, and provide a foundation for e-commerce, as well as a set of fine-tuned controls over network infrastructure and bandwidth.

SEEKING OUT SEMINARS

The "Making Sense of Directories" seminar tour is winding down, but be sure to check out our other offerings. Sign up for the "High-Performance Web" or "State of the LAN" seminars online.

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In short, many observers said it is the best shot IT executives have for restoring order to the chaos of their distributed networks.

"The directory is critical for distributed computing," said Gary Rowe, president of The Burton Group, a consulting firm in Midvale, Utah.

"The directory will become increasingly integrated with security and internetworking. We are going to see an infrastructure that includes applications, policies and network management all supported by the directory," Rowe told a gathering of IT managers at the seminar in San Francisco.

Personalization is also the long-term goal of directory integration, Rowe said. It will mean businesses can serve tailored applications and data to each unique user on both intranets and extranets based on data stored in the directory.

But there are plenty of hurdles before reaching nirvana.

"Right now, the directory is not a panacea. There is a lot of work to do," said Charles Haynes, software development architect for Morgan Stanley Dean Witter Online.

"We see the potential. We want the directory to support policy management and workflow management, and we want it for security management on the Web,"

See **Directories**, page 42

App server aims to simplify Java development

New version of Persistence Software's PowerTier targets Web page builders.

BY JOHN COX

SAN MATEO, CALIF. — The latest version of Persistence Software's PowerTier application server is designed to make life simpler for serious Java lovers.

Maybe too simple for some, though.

In PowerTier 6.0, Persistence has added several features to speed Java development, including PowerPage, which the company says makes it easier to create Web pages that contain Java code. These Java Server Pages (JSPs) interact with Java components stored in the application server. For big, complex applications, PowerPage can eliminate a lot of manual coding.

But that's the kind of coding some Java programmers need in order to build more effective applications, says Gary Rudolph, senior Web developer with Nextel Communications in Reston, Va. "It's OK to use what PowerPage generates as a template or a learning tool," he says. "But I'm not sure I'd use that code as is in our application. I don't like simplifying things too much for developers."

Rudolph, however, isn't opposed to all simplicity. Indeed, Nextel will use PowerTier 6.0 to build a rate management application because the new version of Persistence's tool makes it much easier to apply the latest Enterprise Java Bean security across different machines. The new release also gives Nextel a set of ready-to-use Java classes that will save programming effort, Rudolph says.

PowerTier is especially good at translating between Enterprise Java Bean components and database tables, and has a sophisticated caching system that speeds up the application, Rudolph says.

Another new feature is the PowerTier Servlet Engine, acquired by Persistence from start-up 10BaseJ. The engine, in effect, processes Java programs called

See **Java**, page 42

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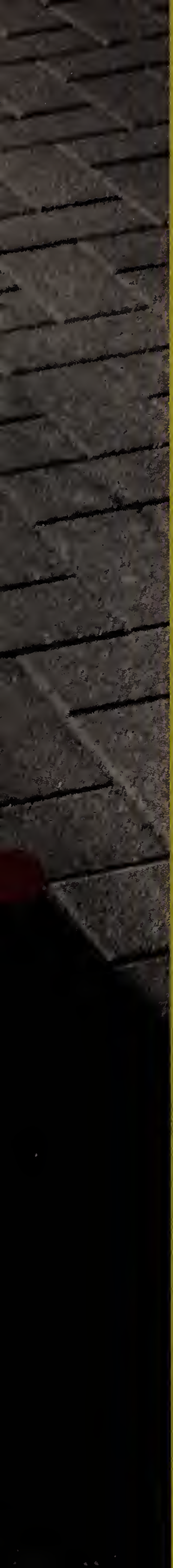

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A network management appliance on a browser

Loran's Kinnetics Network Manager does a good job of monitoring small or midsize networks comprising SNMP-aware devices.

BY BARRY NANCE,
NETWORK WORLD
TEST ALLIANCE

Can network management be reduced to plug-and-play simplicity and still retain its usefulness? Loran Technologies claims the answer is yes. Loran has developed a network management appliance that plugs into your network and lets you manage your network via a Web browser.

We were skeptical. So we put Version 3.0 of Loran's Kinnetics Network Manager through a number of network management tasks to find out whether it could accurately discover, manage, troubleshoot and report on our network.

Our tests revealed Kinnetics to be a surprisingly useful tool. It can successfully map, monitor and produce reports for a small to midsize network (fewer than 5,000 devices) if that network consists primarily of SNMP-aware nodes.

For larger networks, using multiple Kinnetics appliances isn't helpful. We verified with the vendor that the units do not coordinate with each other and thus can show only partial views of the entire network.

Plug-and-go net management

The first sign that Loran's engineers have reduced network management to a manageable science is the six-page Kinnetics preinstallation questionnaire. Via the questionnaire, you convey to Loran the vital statistics of your network. You provide Loran with your IP addressing scheme (static or dynamic), the identity of your default gateway and Domain Name System (DNS) servers, and let the company know if the Kinnetics unit will be Internet-accessible and how many subnets you have on your network.

You also have to tell Loran about the community strings you use, a phone number through which Loran can dial in to the Kinnetics unit for support purposes, the ranges of IP addresses the Kinnetics device should explore as it discovers the network, the types of physical media in use on your network and the brand of file server software you use. Loran then configures a Kinnetics appliance accordingly and ships the turnkey result to you.

After we plugged a unit into our network and gave it an hour or so to ping and poll its way across our environment, we used the Kinnetics browser-based interface to view a network map, set alarm thresholds and produce reports. Network utilization rose an almost imperceptible 1% during the Kinnetics discovery process and therefore did not affect network performance.

The unit gleaned its network topology information from SNMP Management Information Bases (MIB), Address Resolution Protocol caches, bridge and router tables, and DNS messages. Our tests showed that the product correctly handled MIBs from most network devices. A few, such as the Samsung SmartEther 10/100 NWay Managed Switch, were not discovered by the product. To the vendor's credit, it has a formal procedure for adding support for a customer's devices if they aren't already provided for.

The unit itself looks like a slim desktop PC. It has network cable ports, a VGA connector, floppy disk drive and other PC attributes, but the keyboard port accepts only Loran's calculator-size numeric keypad for direct entry of Kinnetics parameters.

Because the unit arrives pre-configured, you rarely use the keypad. In our lab, we used the Kinnetics Web browser interface for virtually all access to the unit's parameters, status information, network map and reports.

Discovering and reporting

For each network node it discovers, Kinnetics records the network address, device type, vendor ID and model information. Kinnetics finds SNMP-aware devices as advertised, but it couldn't see non-managed or SNMP-disabled devices. For instance, our Ascend Pipeline 130 router disappeared from the network map when we turned off its SNMP management feature.

A number of Kinnetics' reporting tools are quite useful. The Network Early Warning System contains extrapolation algorithms that produce network usage projections for capacity planning.

These projections, which appear right on the network map, pinpoint network bottlenecks graphically. Another report, the Automatic Break and Fault Finder, identifies link, port and device failures, and the Network Health panel shows an overview of networkwide conditions. When our alarm thresholds were triggered, Kinnetics e-mailed us and paged us to let us know a problem had occurred.

Kinnetics' real-time reports gave us several other up-to-the-minute views of our network, including traffic prediction, performance, frame relay link status, server status and desktop client connectivity. The frame relay report's display of availability and bandwidth utilization also gave us helpful recommendations for changes in committed information rate.

The real-time, interactive network map is Kinnetics' strongest feature. Java-based and displayed in a Web browser window, the network map let us drill down via point-and-click to access SNMP MIB detail for all the devices Kinnetics could see. The network map's representation of devices and links was unambiguous. In a separate panel, the software displayed a real-time network health summary showing the availability of key devices and links as well as traffic and error information for all network segments. Its graphical rendering of our subnets was sluggish but not unacceptably so.

Installing Kinnetics is a matter of just plugging it into your network, and the product's documentation is excellent. We think the unit is a bit pricey, but it does come with on-site training. If your network is reasonably small and consists mostly of SNMP-manageable devices, you should look closely at Loran's Kinnetics network management appliance.

Nance, a software developer and consultant for 29 years, is the author of Introduction to Networking, 4th Edition *(Que, 1997) and* Client/Server LAN Programming *(Que, 1994). You can contact him atbarryn @erols.com.*

NetResults

Kinnetics Network Manager 3.0

RATING: 7.6 **COMPANY:** Loran Technologies, (800) 563 1178, www.loran.com. **COST:** $31,050 for 500 devices, includes training. **PROS:** Easy installation; interactive network map is intuitive. **CONS:** Limited to small or midsize networks containing SNMP manageable devices, pricey.

	Discovery 30%	Network management 30%	Reports 20%	Documentation 10%	Installation 10%	Total score
Kinnetics Network Manager 3.0	7	8	7	8	9	7.6

Individual category scores are based on a scale of 1 to 10. **Percentages** are the weight given each category in determining the **total score.**

How We Did It

We installed Kinnetics Network Manager 3.0 on our lab's three-segment, Fast Ethernet network. Each segment consisted of a server and several clients along with an SNMP-manageable switch, router, DSU/CSU and hardware probe. In each test, we looked at Kinnetics' ability to discover our network nodes, manage those nodes via SNMP, help troubleshoot problems and report on the network's health.

To access the Kinnetics Web-based user interface, we used Netscape Navigator 4.61 and Internet Explorer 4.01, with Java and JavaScript support enabled.

Nance is also a member of the Network World Test Alliance, a cooperative of the premier reviewers in the network industry, each bringing to bear years of practical experience on every review. For more Test Alliance information, including what it takes to become a member, go to www.nwfusion.com/alliance.

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Directories,

continued from page 37

Haynes said. "We also want to support PKI [public-key infrastructure] and single sign-on."

Those are lofty goals given that the average large company has more than 150 directories, according to Rowe. Consolidation and integration of directories, which are often full of outdated or incorrect data, is no easy task.

The vendor panelists at the seminar, including representatives from Banyan Worldwide, Bindview, FastLane Technologies, Microsoft, Novell and Process Software, agreed that directory integration is the next key for large organizations.

A major push is coming from Microsoft and Novell, both of which are touting metadirectories for integration.

"The metadirectory will be critical because application-specific directories won't be going away anytime soon, so there is no choice in the matter besides integration," said Samm DiStasio, director of marketing for directory products at Novell, which will release its DirXML metadirectory this summer.

"The only proven way to manage multiple directories is through advanced synchronization technologies," said Peter Houston, Microsoft's group product manager for Active Directory.

While Novell and Microsoft agree on integration, they are taking different approaches. Novell is concentrating its efforts on XML for synchronizing directories and pushing changes to a set of interconnected directories. Microsoft is using technology acquired from Zoomit last year to create a central repositoryof directory data to keep directories in sync.

Integration will be a requirement for nearly 95% of large companies, according to Patrick O'Kane, director of integration products at Banyan.

"There won't just be a single killer application," said O'Kane. "It will be hundreds of killer applications that all take advantage of the power of the directory."

And along with those killer applications will come other benefits. Users will be able to deploy Directory Enabled Networks, which use the directory to automatically configure routers and switches to set policies on bandwidth usage and prioritize traffic. The directory also will allow companies to create a PKI for securing extranets and e-commerce.

Those types of efficiencies and services are the tremendous opportunities that will come from unifying directories, Rowe said. But he added it won't come without a lot of foresight.

"For organizations considering an investment in a directory infrastructure, the focus should be on planning upfront," he said. "I have never been involved in a directory project where the company said they did too much upfront planning. Planning pays incredible dividends down the road."

Directories
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Java,

continued from page 37

servlets, which are Java programs that interact with back-end systems. JSPs are one type of servlet. The engine was designed as a high-performance application that can run on several computers.

Nextel's Rudolph says Persistence needs to improve its support for the Java 2 Enterprise Edition (J2EE) specification, the latest description of server-based Java APIs. "If I want to get some Beans from a third party and plug them into PowerTier, I couldn't do that because [the application server doesn't] support 'container-managed persistence' in J2EE," he says.

PowerTier 6.0 supports much of J2EE now, and Persistence plans to add most of the remaining features later this year. A spokesman says container-managed persistence will be added when the J2EE specification for it is completed.

PowerTier 6.0 is available now. A developer's kit costs $7,500; deployment licenses, per CPU, start at $25,000.

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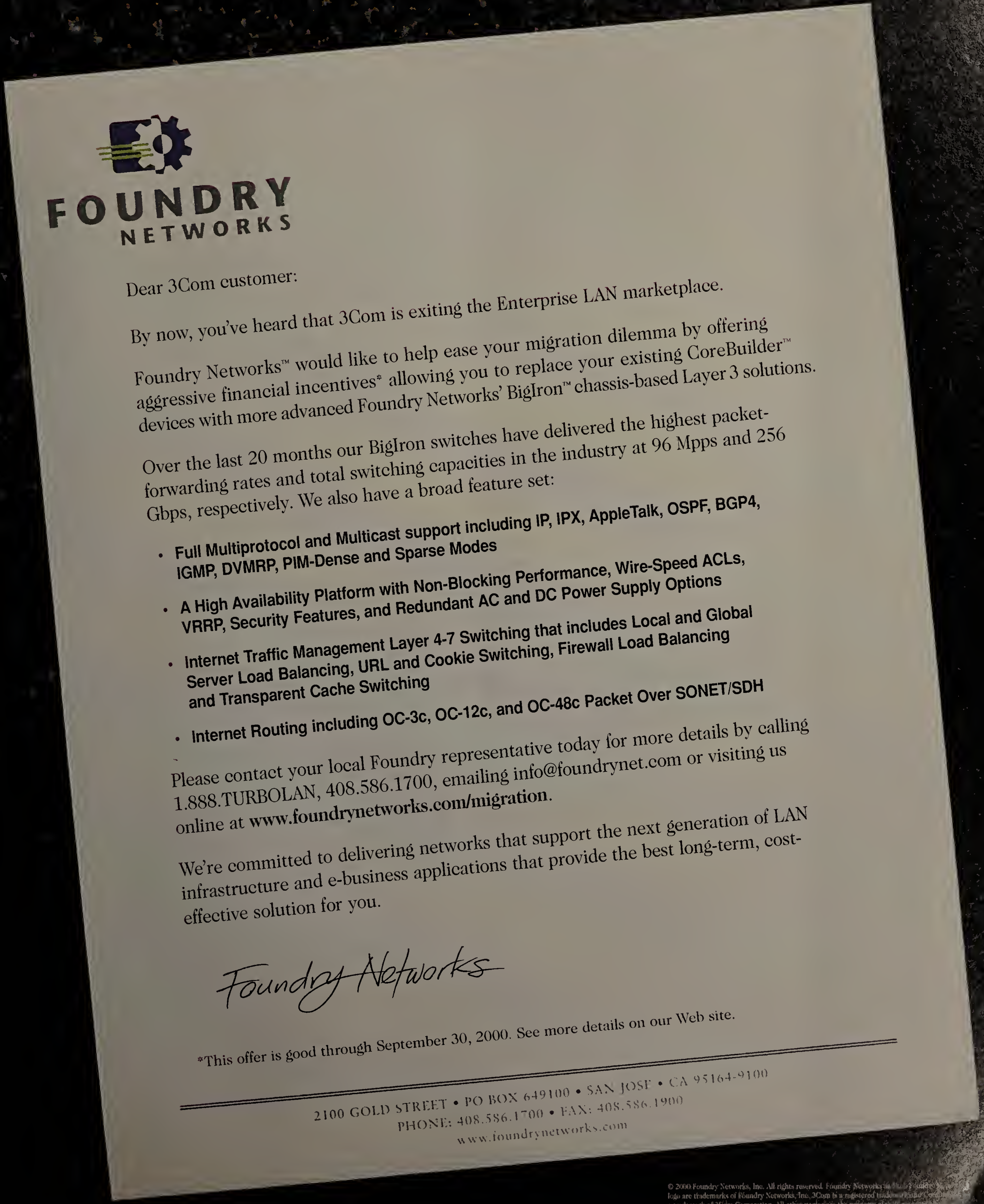

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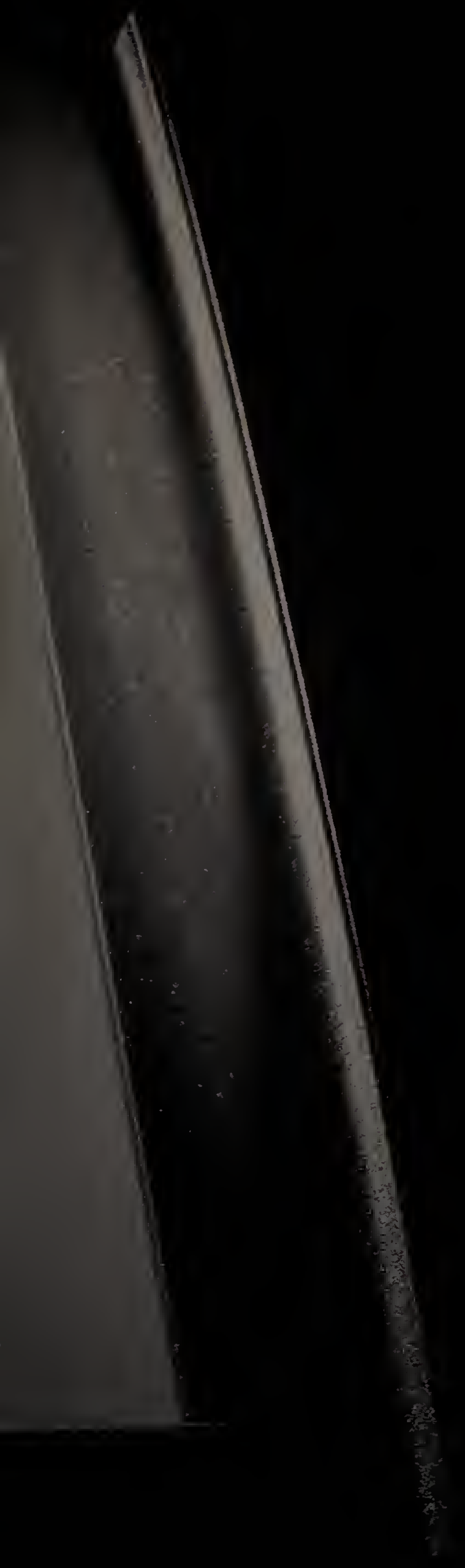

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'Net Insider . Scott Bradner

TETHERLESS IN ADELAIDE, AUSTRALIA

I just got back from the Internet Engineering Task Force meeting in Adelaide, Australia, where I went fully wireless for the first time. This stuff actually works, but can be a great distraction.

IETF meetings have supported one form of wireless LAN technology or another for the past few years, but because I am a Mac user and the Mac drivers for the wireless cards seem to be too funky for me to deal with, I hadn't previously been a participant.

But I recently bought a spiffy Apple PowerBook complete with a built-in Apple AirPort 802.11 compatible wireless card. I walked into the Adelaide convention center where the IETF meeting was being held, woke up my PowerBook, turned on the AirPort card (one click on a menu), selected the AirPort as the TCP/IP port (one click on a different menu) and I was fully connected.

Other than a few funnies due to a misconfigured Dynamic Host Configuration Protocol (DHCP) server on the first day, the connection worked flawlessly the whole week. And because the PowerBook can run for 10 hours on one set of batteries, I didn't even have to plug it in to the power outlet and was free to roam. (Except for one day when I didn't notice that the hotel housekeeping staff had turned off the little power switch next to the outlet, apparently a feature of Australian hotels, and my batteries did not get charged as a result.)

> **If this is what it's like to be always online, I may actually get less work done.**

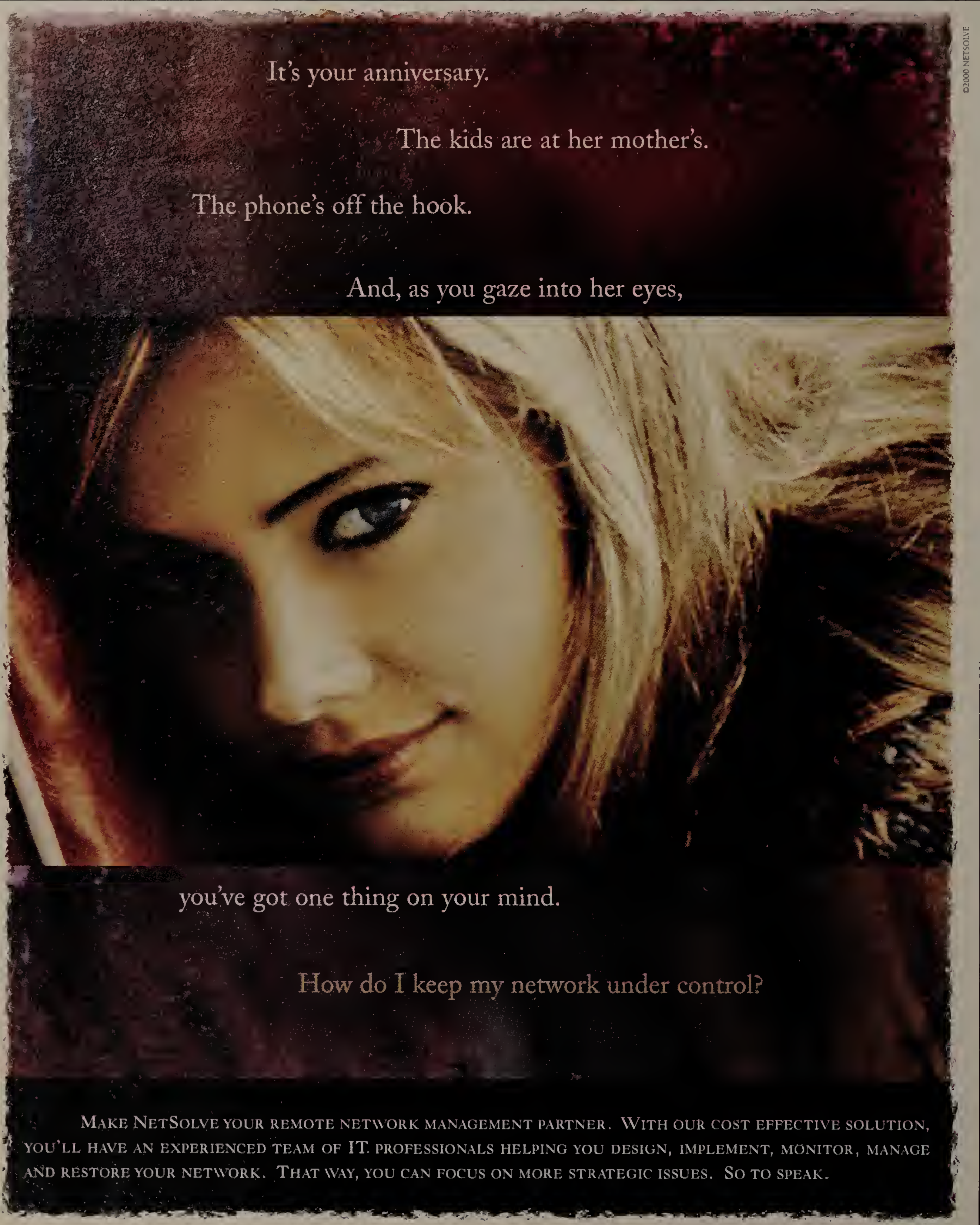
This is great stuff! Very fast connectivity — theoretically 11 MHz — just like sitting at my desk at the office. I could sit in the sometimes boring working group meetings and keep up with my e-mail, check out what was happening in the real world at www.cnn.com or on Wall Street at www.wsj.com. (Note that I differentiate Wall Street and the real world). It's the first time I've come back from an IETF meeting caught up on my e-mail. Great stuff indeed, although rather distracting.

If this is what it's like to be always online, I may actually get less work done. It's hard to pay attention to a meeting while engaged in a furious e-mail exchange on a mailing list or seeing what the market is doing to your stock portfolio. Networks based on 802.11 are beginning to pop up in all sorts of places, including office buildings and airport lounges. Because I expect to see more of this wireless technology, I should figure out how to balance the temptations.

Now I think I'm going to get a base station for the house so I can be in the living room pretending to be sociable while actually surfing away.

Disclaimer: Harvard tries to be sociable, but the above trip was my own.

Bradner is a consultant with Harvard University's University Information Systems. He can be reached at sob@sobco.com.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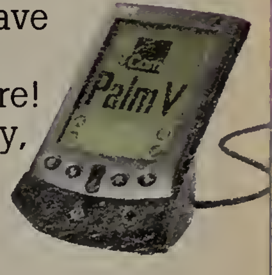

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Technology Update

An Inside Look at the Technologies and Standards Shaping Your Network

Ask Dr. Intranet

By Steve Blass

I've heard of two new acronyms that I believe are protocols. Can you explain what MPLS and MPOA stand for and what they are designed to do?

MPLS stands for Multi-protocol Label Switching. According to RFC2702, *Requirements for Traffic Engineering Over MPLS*, "Multi-protocol Label Switching integrates a label swapping framework with network layer routing. The basic idea involves assigning short fixed-length labels to packets at the ingress to an MPLS cloud (based on the concept of forwarding equivalence classes). Throughout the interior of the MPLS domain, the labels attached to packets are used to make forwarding decisions (usually without recourse to the original packet headers)."

MPOA stands for Multi-Protocol over ATM. The ATM Forum specification says MPOA's goal is efficient transfer of inter-subnet unicast data in a LAN emulation environment. MPOA integrates LAN emulation and the Next Hop Routing Protocol to preserve the benefits of LAN emulation, and allows intersubnet, internetwork layer protocol communication over ATM with no routers in the data path.

Both protocols de-couple the forwarding of a packet from the contents of the packet's IP header, which is useful for features such as VPN support.

For more on multiprotocol switching, see Raj Jain's page at www. netlab.ohio-state.edu/~jain/refs/ipsw_ref. htm, the ATM Forum (www.atmforum.com) and the IETF (www.ietf.org).

Blass is a network architect at Sprint Paranet in Houston. He can be reached at dr.intranet@paranet.com.

Adaptive acceleration saves bandwidth

BY DAVE SUPINSKI

It's no secret that today's networks are under stress. Bandwidth growth can't keep pace with demand from increasing numbers of users, as well as an explosion of increasingly complex applications. User expectations for application responsiveness also are increasing.

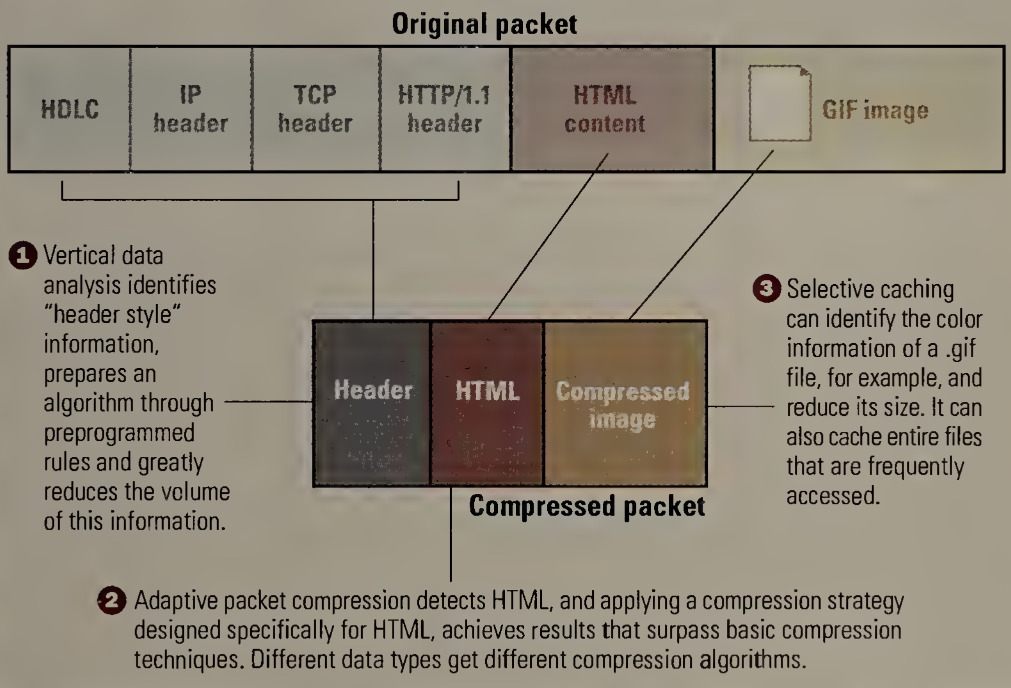
Adaptive acceleration — a new method of expanding existing bandwidth and improving efficiency — offers a remedy. The technology affords ISPs, application service providers and other enterprise customers a comprehensive, auto-learning technology that provides significant improvement in handling data from diverse applications and protocols.

The result is a boost in network performance and an unclogging of bandwidth bottlenecks. In fact, independent testing has shown that adaptive acceleration can boost bandwidth availability by up to 400%.

UP CLOSE

A look inside adaptive acceleration

Adaptive acceleration uses a variety of methods — including selective caching, vertical data analysis and adaptive packet compression — to free up bandwidth by reducing the size of packets. For example:



❶ Vertical data analysis identifies "header style" information, prepares an algorithm through preprogrammed rules and greatly reduces the volume of this information.

❷ Adaptive packet compression detects HTML, and applying a compression strategy designed specifically for HTML, achieves results that surpass basic compression techniques. Different data types get different compression algorithms.

❸ Selective caching can identify the color information of a .gif file, for example, and reduce its size. It can also cache entire files that are frequently accessed.

How it works

Adaptive acceleration is based on several algorithms, including selective caching, vertical data analysis (VDA), adaptive packet compression and quality-of-service prioritization.

Selective caching, an advanced algorithm that identifies which data is worth caching and stores it for later retrieval, is not limited to a specific protocol. Data may include full objects such as an entire .gif file, or a partial object such as a color palette of a .gif file.

It may also include common JavaScript code that appears in HTML pages, or a bitmap that is being repeatedly sent by the Citrix Independent Computing Architecture protocol; for example, several users running Microsoft Word over Citrix Winframe.

Selective caching is effective with Internet traffic (if multiple users go to a certain site, many parts of the site will be cached), and with intranets, where most users are accessing the same site, as well as with Citrix Winframe, SQL traffic, Web casting and Web applications.

VDA dynamically identifies different protocol segments in a packet. Generally, each segment relates to a different part in the protocol stack. For example, VDA might separate a packet into the following sections: .gif file, HTTP/1.1 header, XML, HTTP/1.1 header, TCP, IP and Cisco High-Level Data Link Control.

Separating segments in a "semi-dynamic" manner, VDA is programmed with basic rules and with understanding of some protocols. Using this preprogrammed understanding, it parses packets into their different segments. "Header style" information in each packet — such as sequence numbers and protocol identifiers — is compressed using a dynamic algorithm.

Adaptive packet compression is used in conjunction with VDA and selective caching to reduce data that is not cached, or which was not handled by VDA. Different data types — such as HTML, SQL, Microsoft Word and JavaScript — are assigned different compression algorithms. By applying a different compression strategy to each of these types of data, better results can be achieved than with traditional compression techniques.

Adaptive acceleration features an integrated mechanism that can give time-sensitive traffic such as voice over IP higher priority than other types of traffic, moving it to the front of the acceleration buffer for immediate transmission.

Currently, voice-over-IP traffic can be given a higher priority than other traffic types. In the future, other traffic types will similarly be able to jump the queue based on a company's needs.

Looking ahead

While "free" bandwidth — whether fiber optic, digital subscriber line or wireless — will afford a certain amount of flexibility, utility costs will remain as certain as death and taxes. Clearly, at least until the promises of bandwidth freedom come to pass, companies will need to find creative ways to maximize existing bandwidth and stretch their infrastructure dollars as far as they can.

Supinski is vice president of marketing at Expand Networks, Inc., a maker of bandwidth acceleration products in Roseland, N.J. He can be reached at dsupinski@expand.com.

Gearhead — inside the network machine . **Mark Gibbs**

MORE BE FOR ME AND HOPEFULLY YOU, TOO

Last week, Gearhead started enthusing about BeOS, the multimedia operating system from Be Corp. This week, there is more of the same excitement because this is an operating system that deserves a closer look.

In our survey of features, we covered BeOS' preemptive multitasking with pervasive multithreading and support for eight processors (operating symmetrically), and Gearhead bets you were left thinking, "Tell me more!"

Did we mention BeOS uses protected memory? It does. And crashes caused by applications trying to access memory they aren't allowed to access don't cause the system to fall apart.

When Gearhead saw a demo of the latest release of BeOS (Version 4.5) some months ago, the presenter, who was running BeOS on a twin 500-MHz processor system, grabbed six movie files and dropped them on the desktop where they all started to play simultaneously . . . and playing as they should. Pretty cool, but the best was yet to come.

After switching processors on and off without a blip of any kind in the playback of the movies, he dragged each of them onto the pages of a book animation and then proceeded to turn the pages with the movies still playing in the pages. What was amazing was that the movies conformed to the page shape as they played and as the page turned.

Another feature that will make your mouth water is the BeOS File System, otherwise called BFS. Designed to be big — nay, huge — BeOS' BFS uses a 64-bit multithreaded file system with full journaling. The reason for 64-bit operation is to allow for gigantic storage. BFS can support a maximum file size of 18,000,000,000,000,000 bytes (that's 18 petabytes, my friend).

A journaled file system means that BeOS keeps track of all file system changes to the journal before they are written to the disk, and it does so in real time — as the system runs. This journal is kept on disk so if anything goes wrong, BeOS can reconstruct the file system after a crash. Neat.

And multithreading the file system ensures that it provides the best possible performance for all file system services, including journaling, without reducing the processing capability of the PC any more than absolutely necessary. Note that you can't do journaling without taking a huge performance hit if you don't have a multithreaded file system.

The file system is also built to be "database-like," which allows arbitrary attributes to be appended to files and used in searches. BFS' focus on database-like operation makes searching for files and their attributes fast, but unlike a regular database, the results of searches are lists of files rather than data tables.

So we have a big, bad file system underlying an elegant processing architecture, but surely there's more? You bet.

There's POSIX compliance, which makes a programmer's life easier (porting from a multiuser time-sharing system to BeOS is said to be easy); object orientation in just about every aspect of the system's architecture and operation (that's what dragging the videos onto the book animation is about); a ton of applications; and the list goes on.

Next week we'll look at getting BeOS running. Be there at gb@gibbs.com.

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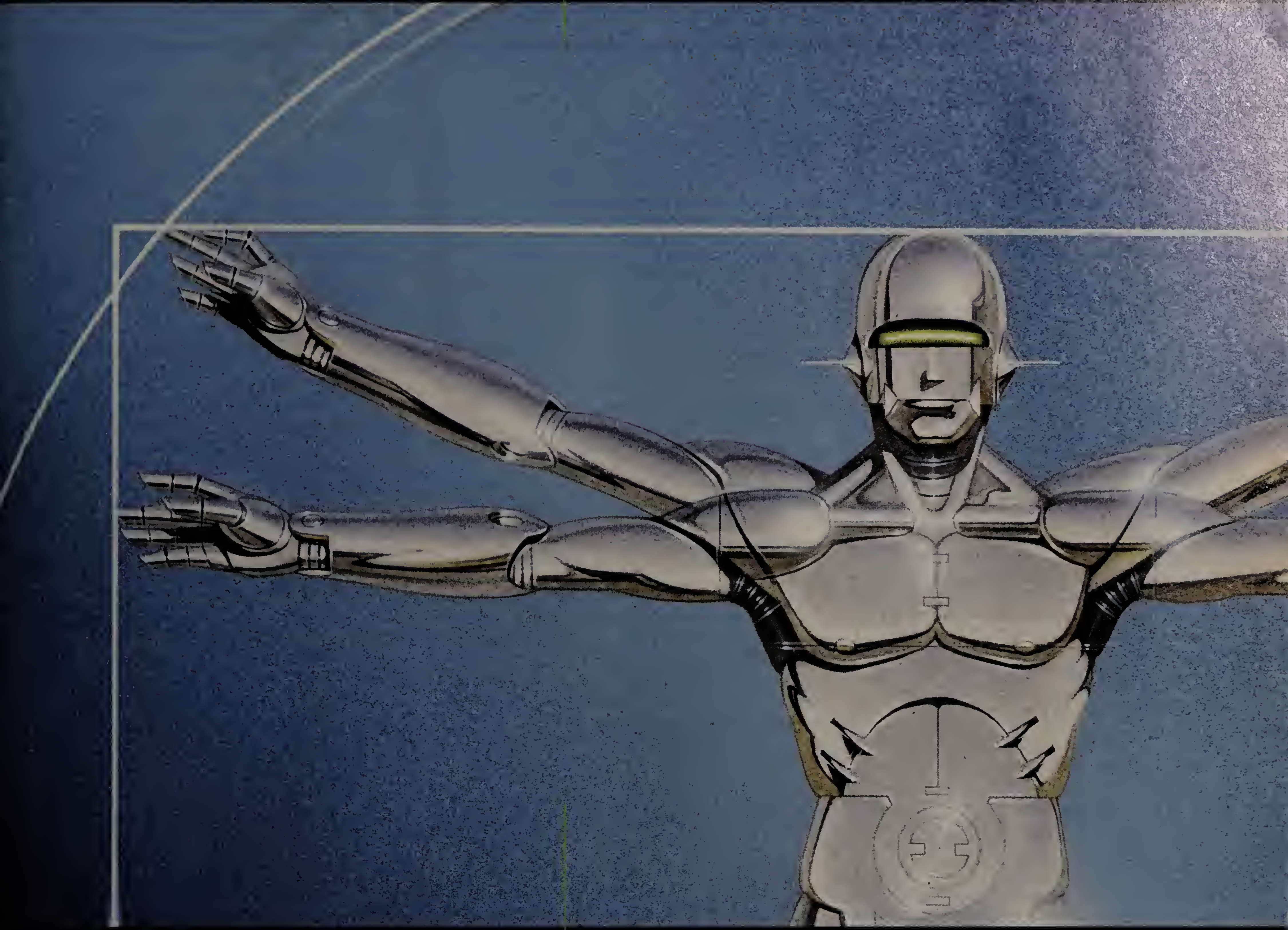

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Editorial

The implications of the Microsoft decision

I find it hard to get excited about the Microsoft antitrust case. The damage has already been done, the market has moved on and, at this point, even the most extreme outcome — breaking up Microsoft — would probably backfire and only serve to strengthen the company.

What's more, the whole legal process is so drawn out that, despite the judge's findings, chances are by the time Microsoft exhausts its appeals, the original complaints will look silly and the government will have lost its fervor. Look back at the IBM antitrust case. It lasted more than a decade and finally in 1981, just dried up and blew away.

But let's run through some basic scenarios with the most extreme possible remedy in mind, which is divestiture:

- Will breaking up Microsoft be good for the industry?

To my mind, yes. Mini Microsofts — possibly grouped along operating systems, application and Internet lines — would be forced to become better industry citizens and this should spell opportunity for other players. While the change wouldn't be evident overnight, slowly the Mini Microsofts would have to embrace other vendors to meet customer needs.

- Will breaking up Microsoft hurt Microsoft?

It certainly would be harder for Mini Microsofts to walk in lockstep, but Microsoft has perfected the manner in which it works with third-party suppliers, so developing compatible products would be a cake walk. The potential downside is time to market. That could take longer.

- How about from a business point of view?

Many folks think Microsoft would be more valuable to investors broken up. One company would sell the industry-standard PC operating system. Another would push the most widely used and successful group of PC applications. And the final group would hawk the most popular Internet browser and attendant tools.

- Will breaking up Microsoft hurt consumers?

No. Cost is not much of an issue any more, and the technology is very simple to use. Those two items would not change with the creation of Mini Microsofts.

- Will Microsoft really be broken up?

No. Divestiture is an extreme remedy the government, regardless of which administration is in power, won't favor. By the time all the appeals are raised the market will have changed dramatically enough to undermine the whole thing.

My guess is the case dies on the vine. How can you get excited about that?

— John Dix
Editor in chief
jdix@nww.com

Message Queue

READY FOR PRIME TIME

I disagree with Daniel Briere and Christine Heckart on the utility of Internet cell phones ("Internet cell phones? Ready, set … wait!" March 13, page 31). Currently in use in my hometown of Helsinki, Finland, is a service that relies on a regular Wireless Applications Protocol-enabled cell phone to order movie tickets and select seats by looking at a small map of the theater. The service is 10 times cooler than Moviefone or order-tickets-by-Internet services, seems to work great in the small amount of space on the device, and is quick and easy to use.

Once you accept that good services on cell phones differ from those on the Internet — just as the Web is different from the VT100-based services of yore — new possibilities emerge.

Petri Aukia
Tinton Falls, N.J.

DARE TO DELAY

I am writing in response to the negative article on Nortel Networks' decision to delay the release of its Accelar 8600 ("Nortel's Layer 3 switch still a moving target," March 20, page 10). As a network professional, I applaud this decision. Too many technology companies, in their rush to market, release immature products that wreak havoc. I hope that other companies have the courage to make the same decision, as it would improve the tarnished image many voice professionals have of the data side of the house.

Paul Smith
New York

A TIME-SAVER

Regarding your feature "The PDA predicament" (March 20, page 75), staying abreast of technology and security evolvement is a challenging task made easier by articles like this, which provide insight into new advances and suggest management practices and policies. Thanks for the time-saving information.

John Cooke
Tallahassee, Fla.

GET PRIORITIES STRAIGHT

In his "Backspin" column "Overtightening Novell's nuts" (March 13, page 90), Mark Gibbs writes: "I would have preferred to use NetWare to run our customer server suite instead of NT for several reasons, including reliability, performance and security. Unfortunately, NaviSite doesn't offer support for NetWare."

So Gibbs is saying outsourcing to NaviSite is more important than reliability, performance and security?

Nothing is more important than reliability, performance and security on a network. If NaviSite cannot meet Gibbs' needs, then he should find a company that can. By Gibbs' own definition, NetWare is more reliable, performs better and is more secure than NT. I happen to agree.

Stop participating in self-fulfilling prophecies. Demand the support you want and be part of the solution.

Herb Hill
Professor
Niagara College
Ontario, Canada

NOT THROWING IN TOWEL

I read your article on 3Com's restructuring ("Big changes brewing for 3Com," March 13, page 1) and wanted to make a clarification: Cabletron is not one of the suppliers throwing in the towel on the enterprise marketplace. Far from it.

The formation of Enterasys Networks is proof that we intend to compete vigorously in this space. Our transformation sends a positive message to our important customers, prospects and channel partners that we offer strong enterprise network solutions.

We are poised to offer enterprise customers what they want and deserve: Total solutions from a viable partner with more than 15 years experience in networking, a strong intellectual property portfolio, a rich set of products and services, and experienced, committed people who understand their business.

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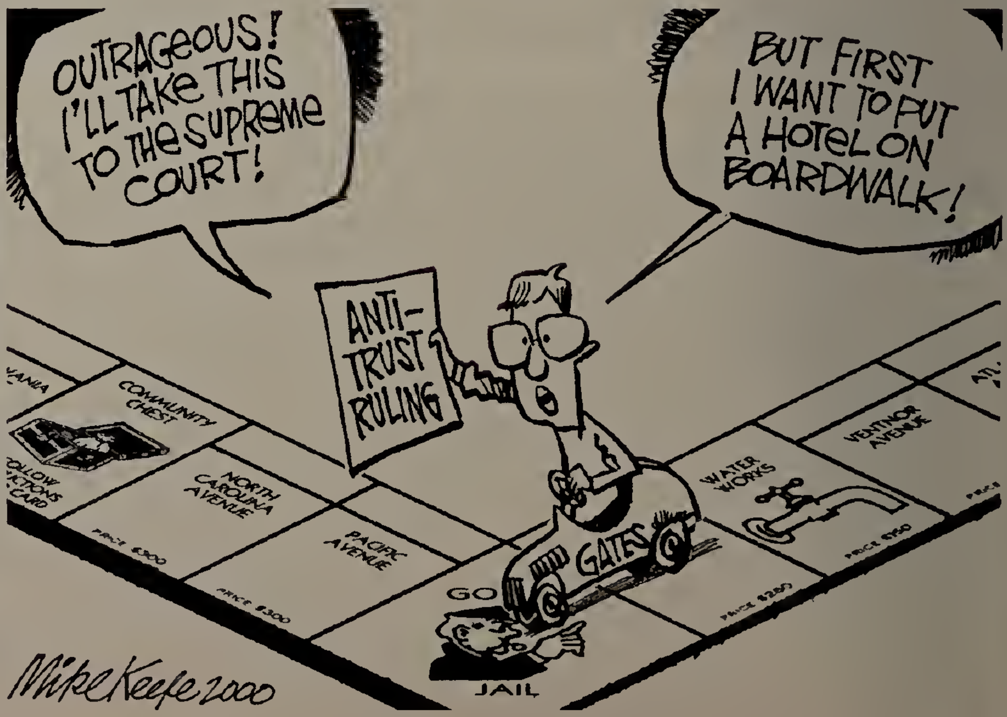


Venture Over the Horizon . Todd Brooks

OPTICAL NETWORKS: AT YOUR SERVICE

Gigabit Ethernet and the increasing use of dense wave division multiplexing (DWDM) have increased bandwidth in high-speed corporate networks and long-distance telephone routes. What has been overlooked is the piece that lies between the corporate net and the Internet backbone — the metropolitan-area network (MAN).

Optical networks have the potential to allow phone companies to bridge this MAN-hole. A number of vendors are developing optical technologies that address the MAN market. Ciena and Sycamore now offer metropolitan optical provisioning products. More than a dozen start-ups, including White Rock Networks (a Mayfield investment), Alidian Networks, Optical Networks and Kestrel Solutions, are also developing products in this arena.

While the big telecom providers will eventually deploy these MAN technologies, a new breed of communications service providers will be first to address the MAN upgrade markets by providing cheap and dynamically configurable bandwidth. For example, Yipes of San Francisco offers a MAN regional area IP service for connecting LANs between business locations at speeds up to 1G bit/sec. Customers can select speeds from 1M bit/sec to 1G bit/sec, and LAN connection speeds can be increased on demand. Other net metropolitan optical service providers are Cogent Communications and Millennium Optics.

While these metropolitan service providers bridge the gap between optical Internet backbones and the basements of office buildings, flexible, high-speed connectivity to businesses inside these buildings is being addressed by yet another class of start-up service provider. These firms are rewiring high-rise office buildings with high-speed fiber optics thanks to new deregulation that enables competition to the regional Bell operating companies within these buildings. Several such "riser" companies sprung up in 1999, including Allied Riser, Cypress, Broadband Office and E-Link (another Mayfield investment).

One of the beauties of flexible DWDM architectures is the bandwidth can be tailored to fit customers' needs. If, for example, you need more bandwidth on Tuesdays because that's the day you conduct extensive interoffice videoconferencing, you can pay extra on that day for more bandwidth. This kind of dynamic service is just beginning to be delivered.

In many cases, today's cheap, flexible optical service offerings may only be appropriate for corporate Internet access because they lack the restoration mechanism inherent in more expensive SONET ring architectures. An overabundance of capacity in metropolitan optical schemes should ensure adequate quality of service, while new virtual private network advances will enable businesses to shift from expensive dedicated private lines to economical DWDM-enabled Internet access. But for many mission-critical applications, the cost advantage is not enough to justify the network protection risk.

As the focus shifts back to how to connect corporations to the 'Net backbone, it's important to keep abreast of optical network developments. While the new service providers may not be familiar names yet, the services they offer will allow you to not only get greater bandwidth outside your corporate networks but also gain greater control over that bandwidth.

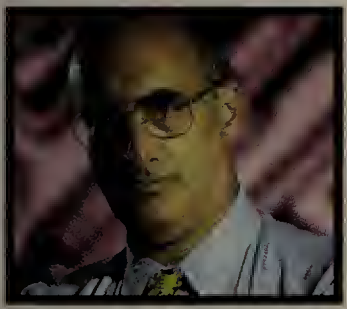
Brooks is a general partner with Mayfield Fund, a venture capital firm in Menlo Park, Calif. He can be reached at tbrooks@mayfield.com.

Yankee Ingenuity . Howard Anderson

IRIDIUM'S DEMISE: A CASE OF MISREADING THE MARKET

It was with great sadness that I watched the curtain fall on Iridium a few weeks ago. That day, I received dozens of e-mail congratulations from those who had seen Yankee Group research and my own prognostications going back five years saying the Iridium concept was fatally flawed. But I felt terrible nonetheless.

Let's do a postmortem. How could a company as savvy as Motorola have misread the market so badly?



Let me be forthright: I own an Iridium phone. I paid full retail for it: $3,500. I sent it into the jungles of Vietnam and Cambodia with my daughter; I took it with me to South America, Australia and Africa.

Did it work well? No. Of the dozens of times I tried to use it, it worked once. Once. But the amazing thing is that it worked at all.

Why did Iridium fail? Because there was no sustainable need for the service. But in corporate America, when a CEO wants to believe something, he can find the numbers that will support his "vision." Yes, there are 100 million homes in America, 500,000 vending machines, 122 million cars, 71 million trucks. So what? Yes, there could be remote locations where sheepherders would love to be able to call Mommy in Queens, but the call's cost would be 30% of their monthly income.

Usually what happens in these business plans is a CEO takes an extremely large number (six billion people in the world), adds some classic number (half of whom have never made a phone call) and declares a multibillion-dollar number as the size of the addressable market ($20 billion). He then pontificates that his goal is only to get a small percentage of a very large number (5%) and gives the seemingly logical conclusion that his market estimate is accurate. But it's nothing of the sort.

Years ago, The Yankee Group invested money in American Mobile Satellite Corp., whose mission was to put small antennae on trucks, allowing drivers to communicate with their head office as they rolled across America. The idea was the company would use traditional cellular when it was in the cities, reverting to satellite when it was on the open road. By the time we finally got the company up and running, virtually every major highway had been outfitted for cellular.

Iridium was run by Ed Steano, who had previously held the No. 3 job at Motorola. Steano is as smart and tough a manager as you will find — gruff, focused, no B.S. How could such a guy get so blindsided? The answer: He wanted to believe.

Satellites are not fiber optics. For one thing, they start to fall out of the sky the minute you launch them, especially if they are on low-Earth orbit. So while fiber will stay in the ground for 20 years, a $9 billion investment in satellites is going to last just six years — at $1.5 billion per year. If you have only 100,000 subscribers, your cost is going to be $15,000 per year, per subscriber. Even if you have one million subscribers, your cost is going to be $1,500 per year. Assuming that someone used your phone for 25 days per year when they were not within cellular serving areas, the cost comes out to $60 per day — and that's what it costs, not what the company would charge.

In my two years of owning an Iridium phone, I made one essential phone call, so my cost per call was $3,500. I am taking that phone and bronzing it to remind me to be wary of technological feats that suck up money. Before I sound sanctimonious, let me add that it's important to try new things. But maybe we should do better homework on technologies that are elegant but doomed.

In the meantime, is anyone interested in a bronzed Iridium phone that was used only once?

Anderson is senior managing director of Yankeetek, a Cambridge, Mass., venture incubator. He is also chairman of The Yankee Group and the William Porter Distinguished Lecturer at the Massachusetts Institute of Technology. He can be reached at banderson@yankeetek.com.

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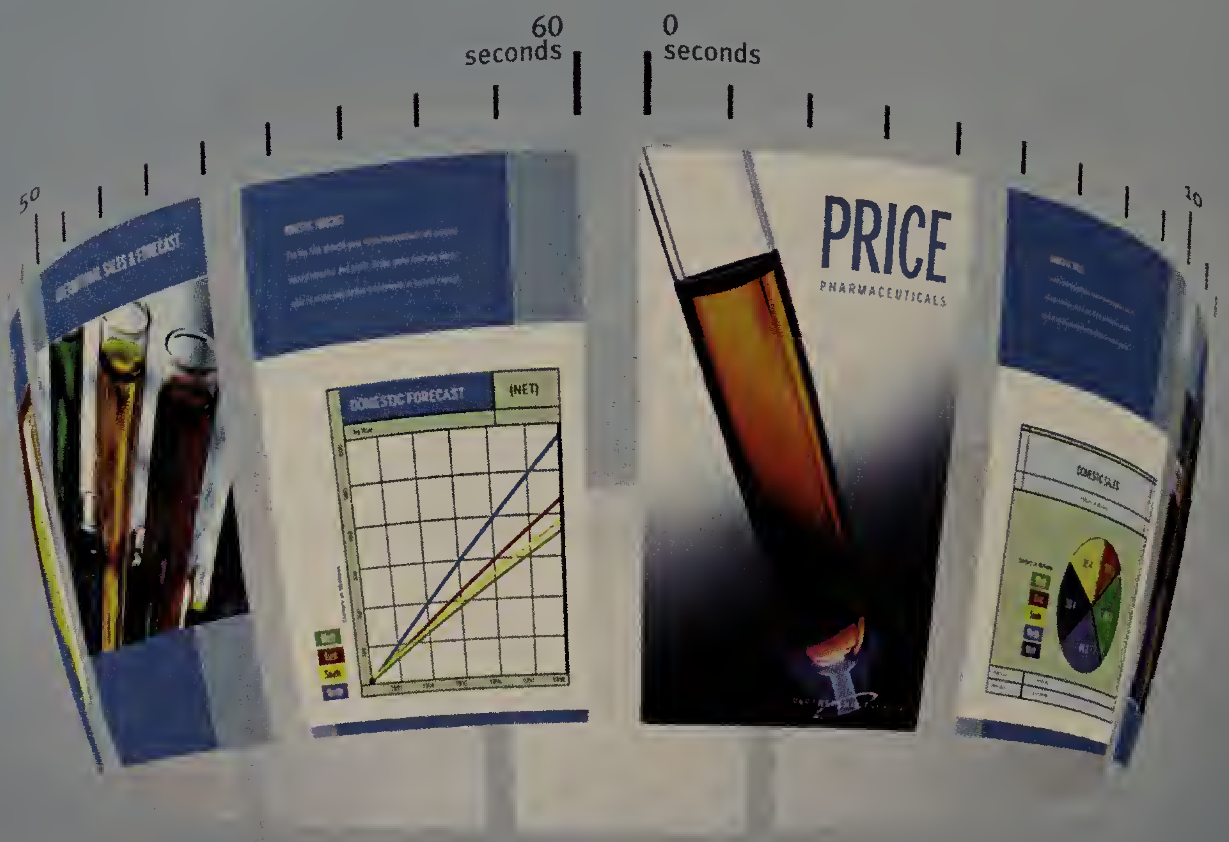

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CACHE PANACHE

A well-placed caching device can boost Web site performance and cut WAN costs.

BY STEVEN G. CLEGG

Effectively placed caching hardware can help you deliver fresh Web pages to end users, improve the efficiency of your Web site, cut WAN access costs and even shore up security against outside hacker attacks.

ISPs and carriers have been quick to cash in on the technology's backhaul savings, but new freshness algorithms, which allow cache devices to better anticipate which Web objects to store, are making caching more attractive to businesses as well.

Here's the basic idea: Storing Web data close to end users allows you to conserve WAN bandwidth and save money, because it's faster and cheaper to retrieve objects from the edge of your network than from the bowels of the Internet.

Reverse caching, or placing a cache between your Web servers and visitors to your site, can pump up Web server performance while adding Web-site traffic surge protection. To gain the most benefit from caching technology, you can combine the two types of caches, installing the devices at e-commerce Web server farms, in remote offices, at your corporate headquarters and in front of intranet Web servers.

While a caching device can work with a firewall, it also serves as its own security layer by limiting outside access to internal corporate network resources. Since all requests for Web pages go through the cache, and then are forwarded by the cache if the page can't be found, the cache provides another layer of protection against outside hackers who want to gain access to internal IP addresses.

There are many variables in determining which type of cache deployment is best for you. Some factors you need to consider are deployment price vs. raw performance speed, hit rate vs. cache location, the types of freshness algorithms employed and placement of the cache with respect to end users.

To analyze cache deployment prices against raw performance speeds, see our review table of the products tested in IRCache's bake-off (see graphic, page 62). IRCache combined total price, including cost of installation, with raw performance speed to come up with a figure that represents how much performance $1,000 can buy.

Multimedia features

Of course, there are other features to look at besides the price/performance. For example, Network Appliance's NetCache is a high-end device targeted at ISPs, carriers and large enterprise customers. It has a feature that allows you to distribute, as opposed to store, Apple's QuickTime, Microsoft's Windows Media or RealNetworks' G2 multimedia formats. The cache acts as a transparent proxy, allowing live content to be split and shared by nearby end-user clients. Moving the multimedia distribution to the network edge can drastically reduce origin server load and WAN bandwidth consumption.

InfoLibria's DynaCache, like NetCache, is also targeted at ISPs and enterprise networks. DynaCache's failover pass-through allows your network to avoid traffic interruption when the power is lost — its electromechanical bridge lets traffic bypass the cache. But configuring DynaCache presents a steep learning curve.

Conversely, Cobalt Networks' CacheRaQ 2 offers a jump-start into caching for little money and expertise. CacheRaQ 2 offers an LCD and three buttons that enable administrators to completely configure the unit with IP information and have it running in less than 15 minutes. The Web-based interface can be used to monitor the size of the cache, providing information about overall performance, transmit and receipt rates, and caching efficiency.

Also targeted at small and midsize companies is Quantex Microsystems' WebXL, a Novell ICS engine cache appliance designed for rapid deployment in an ISP or enterprise environment. WebXL is in its first release, so technical support is still spotty. WebXL features installation wizards with easy menus to simplify the process.

If you're looking for variety, CacheFlow offers products that range from the entry-level CacheFlow 110 to top-of-the-line CacheFlow 5220. Each device offers an optimized operating system called CacheOS. CacheOS compares each URL and indexes Web objects according to type and similarity in order to gain fast retrieval — for

NetworkWorld BUYER'S GUIDE

Caching hardware

Feature:

Twenty cache appliances competed in the industry's largest ever bake-off. See results on **page 62.**

Online:

You can find everything you need to know about cache products in our interactive Buyer's Guide database. **DocFinder: 7624**

When a Seattle law firm needed to save WAN bandwidth, it turned to a caching appliance. **DocFinder: 7625** example, storing all sports-related Web objects in the same area on the hard drive.

CacheOS also identifies and fetches popular content in advance so that it will be fresh when the next request arrives. Called adaptive refresh algorithm, the feature monitors the frequency of use and change for each stored Web object. Using a heuristic, it then predicts when the object will become stale and proactively refreshes the object before the next hit is likely to happen.

If you're really concerned about price and are willing to invest time and skills, there's NLANR Squid, a free open source cache product. Squid requires considerable technical expertise to configure, run and maintain.

Cache comparisons

Once you've scoped out available products, you can evaluate further, focusing on hit rate and freshness algorithms.

First consider the hit rate, or the percentage of times a cache serves up a request, compared with passing it on to the origin server. Much of the hyperbole in vendor advertising is about hit rate, but here's the kicker: Caches used on the edge of a carrier or ISP network, where users access millions of pages of data from the Internet, rarely see hit rates above 50%. However, if the cache sits in front of a company's Web site where server information and the number of data pages is finite and easy to predict, hit rates of 80% or higher are possible.

Fresh or stale

Besides hit rate, you should consider the freshness feature of the caching hardware. Because caches store objects that change over time, the devices must determine the freshness factor of each object and replace outdated objects as they change. Vendors differentiate cache devices with freshness algorithms that automatically update a Web object. Algorithms can define refreshness time, send get-modified requests, predict object life expectancy and perform active caching.

An algorithm can allow you to lengthen the cache refreshness time to limit the number of times the cache has to search for the origin server.

Online See more than 30 caching devices from these 16 vendors featured in *Network World's* interactive Buyer's Guide database.

- CacheFlow
- Cisco
- Cobalt Networks
- Compaq
- Dell
- Eolian
- IBM
- iMimic
- InfoLibria
- Lucent
- Microbits
- Network Appliance
- Pionex
- Quantex Microsystems
- Stratacache
- Swell Technologies

Another algorithm can send a "get if modified" request to the origin server. Each time an object is requested by a client browser, the cache checks with the origin server and only makes a change when needed. Another algorithm lets administrators set controls by estimating the life expectancy of each object based on the time elapsed since the object was last modified.

Cashing in on location

Once you get past freshness and hit rate, it's all about location. As a rule, always store frequently accessed content as close as possible to the user.

For large organizations, caching at the network edge reduces WAN traffic by 25% to 30%. Besides decreasing costs, it enhances response rates and improves the quality of service to users accessing the Web site.

In fact, companies can deploy proxy caches, in which each browser is manually pointed to the cache, and transparent caches, in which a switch diverts HTTP requests to the caching device in tandem across the Internet and intranet to save money.

High-speed remote access to people working at home requires caching at the ISP point of presence due to the slowness of the public switched network. ISPs use transparent caches so they don't have to reconfigure each browser, and there's money saved on back-haul connection costs for each Web object retrieved from the cache.

Caches can also be a cost-efficient alternative to replication at mirror sites. The quality of service dramatically improves for remote or international offices when a cache server is placed at each site. Long distances for back-hauled traffic, multiple router hops and points of congestion are speed killers. Putting an accelerator in a far-flung office negates the latency issues and keeps down access costs.

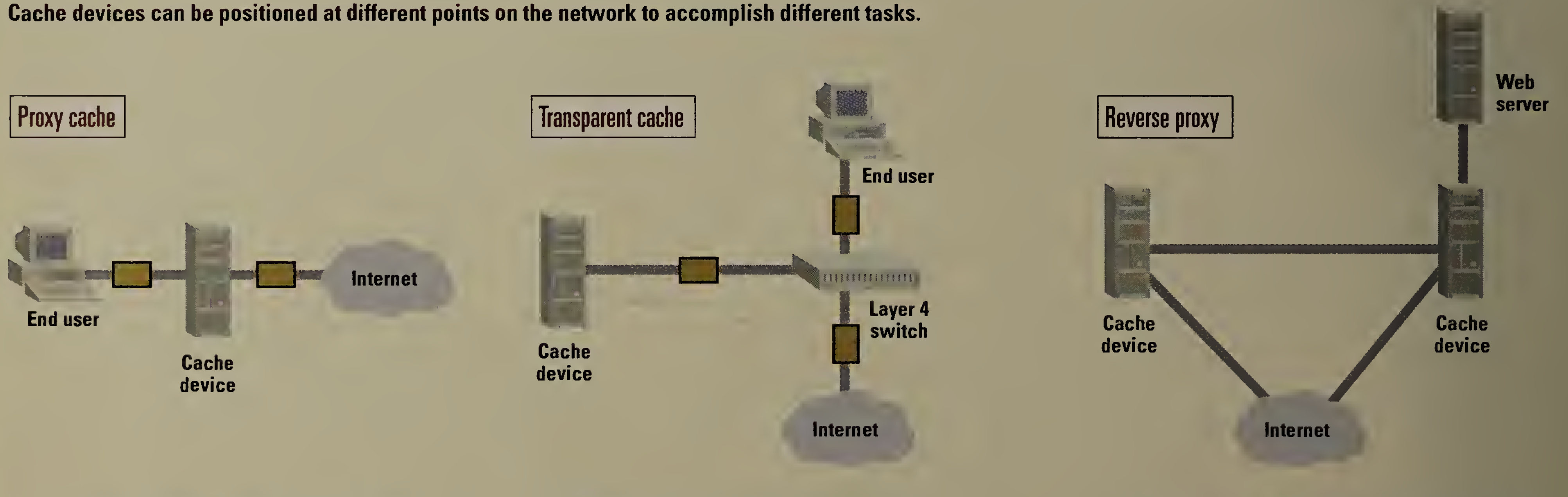
Proxy caches are particularly useful on enterprise intranets. They act as firewalls to shield servers against Internet attacks. A proxy also can act as policy enforcer for a company's Web access, because browsers are configured to send requests for Web objects directly to the proxy cache.

Additionally, reverse proxy caching in front of your Web server farm can decrease the number of origin servers needed. It also acts as a buffer to protect Web servers against spikes in traffic and guarantees fast Web object display.

Continued on page 60

THREE WAYS TO IMPLEMENT CACHING

Cache devices can be positioned at different points on the network to accomplish different tasks.



Proxy caches are useful on enterprise intranets. Browsers are configured to send requests for Web objects directly to the cache instead of the origin server.

Pros: Acts as a firewall to protect internal network resources and as a policy enforcer to eliminate unproductive Internet access.

Cons: Burns costly administrative dollars to configure each browser in the company.

Transparent caches sit next to the WAN edge examining every packet going out to the Internet. If a Web object has a match in cache, it is retrieved and sent back to the user.

Pros: No plodding around to reconfigure every user's browser. Works well at peering points between the ISP and network because no explicit configuration is required for other caches.

Cons: Transparent caches become a choke for all Internet access traffic.

Reverse proxy caches offload client requests from the Web server, preventing unforeseen traffic surges from bringing the server to its knees.

Pros: Helps control costs by reducing the number of origin servers required.

Cons: Current solutions don't offer many freshness options.

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Edward M. Cluss, President & CEO, InfoGear

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Continued from page 58

Cache management

Like any device, caches need to be installed and managed. Only two vendors, Cobalt and Quantex, offer caching hardware that installs in 15 minutes flat. While Squid and some other products are free, the real costs are setup and management, in addition to learning more about Linux and Unix. Also consider each product's management capabilities. Notable features include Management Information Base II support, e-mail or pager event notification, and the ability to remotely monitor and configure the cache device.

To ease administration, Cobalt Network's CacheRaQ 2 offers browser-based and command line interfaces, so the device is simple to configure and easy to manage. CacheFlow's and Quantex Microsystems' devices provide an additional resource by employing a Java-based graphical user interface that links to indexed online documentation. This FAQ index offers technical advice for increasing hit rates and improving cache freshness. Because a cache must be tuned for each network, administrators benefit from this available management and statistic reference for optimizing the cache setup.

On the management side, InfoLibria's DynaCache offers improved capability — not only does it log an event, but an administrator can set the cache to automatically invoke a bypass mode or completely shut down the cache.

Cluster Management

For managing cache clusters, Network Appliance's NetCache provides cluster management tools. Cache clusters can be managed in virtual and logical configurations.

Managing a cluster requires administrators to designate a master cache along with slave caches in which information gets checked against a battery of stored Web objects. Administrators designate settings for keeping a set number of object copies, storing like information contiguously, in addition to setting cluster table updates.

With good price/performance, hit rate, algorithms and a strategy to locate caches, an object saved to cache could be money earned.

Clegg is founder and principal of Beacon Strategies, a Mountain Green, Utah company that specializes in competitive analysis for the Internet backbone and telecommunications industry. He can be reached at sclegg@beaconstrategies.com.

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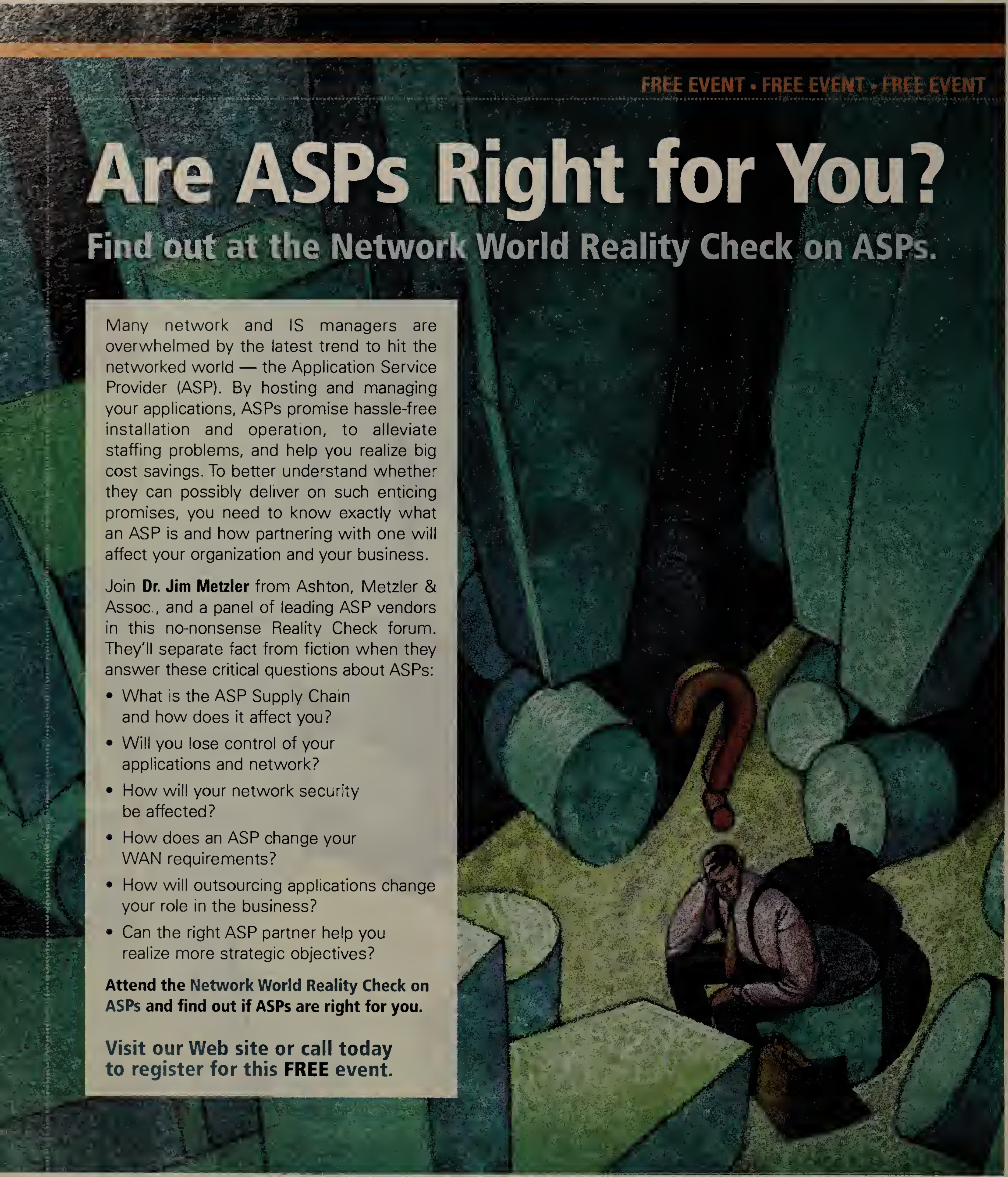

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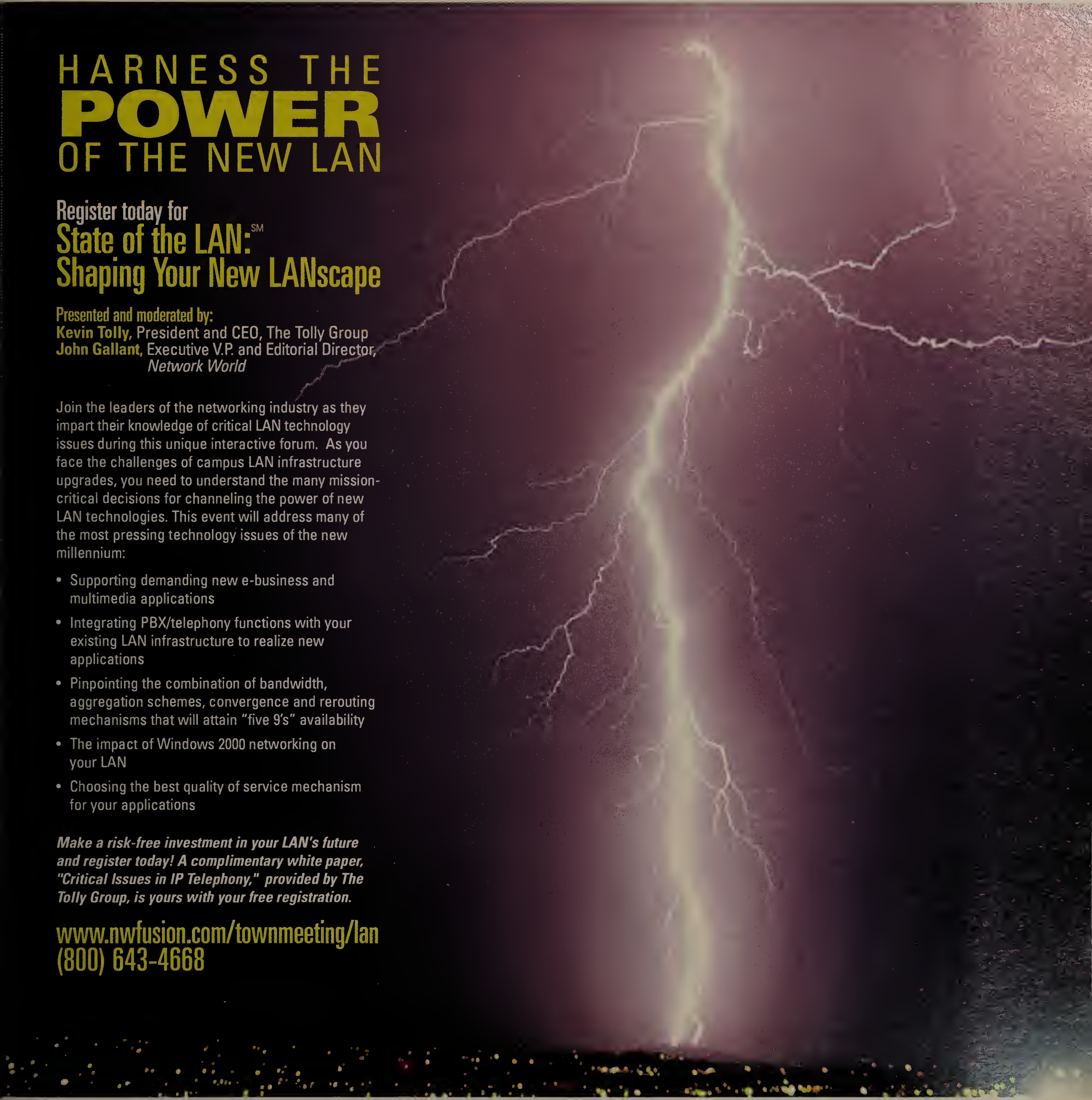

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RECIPE FOR A

CACHE BAKE-OFF

Take 20 products, turn up the heat, cook for 14 hours.

BY ALEX ROUSSKOV, DUANE WESSELS AND GLENN CHISHOLM

Because the average user can only stand to wait a maximum of eight seconds for a Web page to load onto his desktop, performance becomes everything. And Web caching has emerged as one of the best techniques for improving Web response times and for reducing bandwidth requirements for corporate WANs and ISP networks.

IRCache, a research group funded by the University of California at San Diego, recently tested 20 Web-caching products in a two-week bake-off in Cypress, Texas, at space donated by Compaq.

Using IRCache's Web Polygraph proxy benchmark, each product was tested in five key areas:

- Peak throughput. This measures the maximum number of HTTP requests per second that the cache can handle at peak load. The results are presented in a price/performance metric that shows how much throughput can be purchased for $1,000.
- Hit ratio. This measures the percentage of times the cache successfully finds a requested Web page on its hard drive. The higher the hit ratio, the better the cache is performing.
- Cache age. Because caches have a finite amount of storage space and are programmed to allow new objects to bump out old objects, cache age measures the average age of the oldest object in the cache. If you have objects many hours old still in the cache, that means you have an ample amount of storage and your hit rate will probably be high.
- Response time. The time it takes for a packet to be delivered under peak load.
- Downtime. The time it takes for the cache to recover from an outage.

Fourteen vendors participated, which is three times as many as took part in the first bake-off last summer. The participants were Cisco, Compaq, Dell, IBM, iMimic, InfoLibria, Lucent, Microbits, Network Appliance, Stratacache, Pionex, Quantex, Squid and Swell Technologies. Cacheflow and Eolian registered for testing but failed to actually participate. Cacheflow ignored our request for an explanation of its absence. Eolian participated with its shipping product in the first bake-off, and officials report that the next-generation product was not ready for public performance testing at the time of the bake-off. Inktomi is currently boycotting all bake-off tests. Also absent from these tests were Cobalt, Entera, Microsoft and Netscape.

While *Network World* does not typically pit beta products against shipping products, the IRCache bake-off rules allow vendors to submit beta units if they will be generally available within three months of testing. The products tested in beta were Cisco's Cache Engine 590 and Cache Engine 7300, iMimic's DataReactor 5000, InfoLibria's DynaCache 30i Version 3.0 and a cluster of three DynaCache X1 boxes, Lucent's IPWorX WebCache 100 Version 2.0 and IPWorX WebCache 150a Version 2.0, Swell's Tsunami CPX-1000 and Network Appliance's NetCache Appliance 4.1. Most of these products are on schedule to ship by May 1 with the exception of Cisco's Cache Engine 7300, whose scheduled ship date has slipped to some time this summer.

Measuring price/performance

We normalized our raw throughput numbers to arrive at a figure that depicts how many requests per second $1,000 can buy). The higher the measurement, the better the price/performance.

Product	Requests per second per $1,000
iMimic DataReactor 5000	102
IBM 3500M10	72
Dell PowerEdge 130B	67
Quantex Microsystems WebXL 4000	67
Stratacache Flyer 100	63
Compaq TaskSmart 900	60
IBM 5000	54
Microbits Intelli App Pizza Box	53
IBM 5600	52
Compaq TaskSmart 2500	47
Squid	37
Swell Tsunami CPX 1000	33
Lucent IPWorX WebCache 100	33
InfoLibria DynaCache X1 cluster	32
Lucent IPWorX WebCache 150a	28
InfoLibria DynaCache 30i	25
Network Appliance NetCache	25
Cisco Cache Engine 590	21
Pionex PCA 1000	23
Cisco Cache Engine 7300	18

Most of the products tested can be considered caching "appliances." That is, you buy them as preconfigured hardware and software bundles designed specifically for one task — Web caching. The exception is Squid, which is a pure software cache that ran FreeBSD as its underlying operating system. The authors acknowledge they have participated in the development of Squid software; however, neither the rules nor the method of testing were changed in any way to benefit the Squid product.

Ten entries ran Novell's Internet Caching System (ICS) software. These vendors — Compaq, Dell, IBM, Microbits, Stratacache, Pionex and Quantex — sell their caching products under an OEM agreement with Novell. Cisco, InfoLibria and Network Appliance have proprietary operating systems for their products. The entries from iMimic, Lucent and Swell Technologies all run on open source operating systems — either Linux or FreeBSD.

All the products we tested use either Intel Pentium, Celeron or compatible CPUs. There is relatively little customized hardware in these systems. If you buy one of these caching products, and for whatever reason the caching configuration doesn't work out, you can probably still use the hardware for some other purpose on your network.

Our testing rules require that vendors provide all necessary network equipment with their entry. We found that all products employ commodity Ethernet switches or hubs for network connections. One of InfoLibria's entries also uses a proprietary device, called DynaLink, which bypasses the cache when the power or any of the equipment fails.

Getting to the numbers

Price/performance is an important factor in most buying decisions. Instead of charting raw data, or comparing a $5,000 device with a $50,000 device, we normalized the throughput results to arrive at a number that answered this simple question: "How much throughput can $1,000 buy?" (See graphic, left).

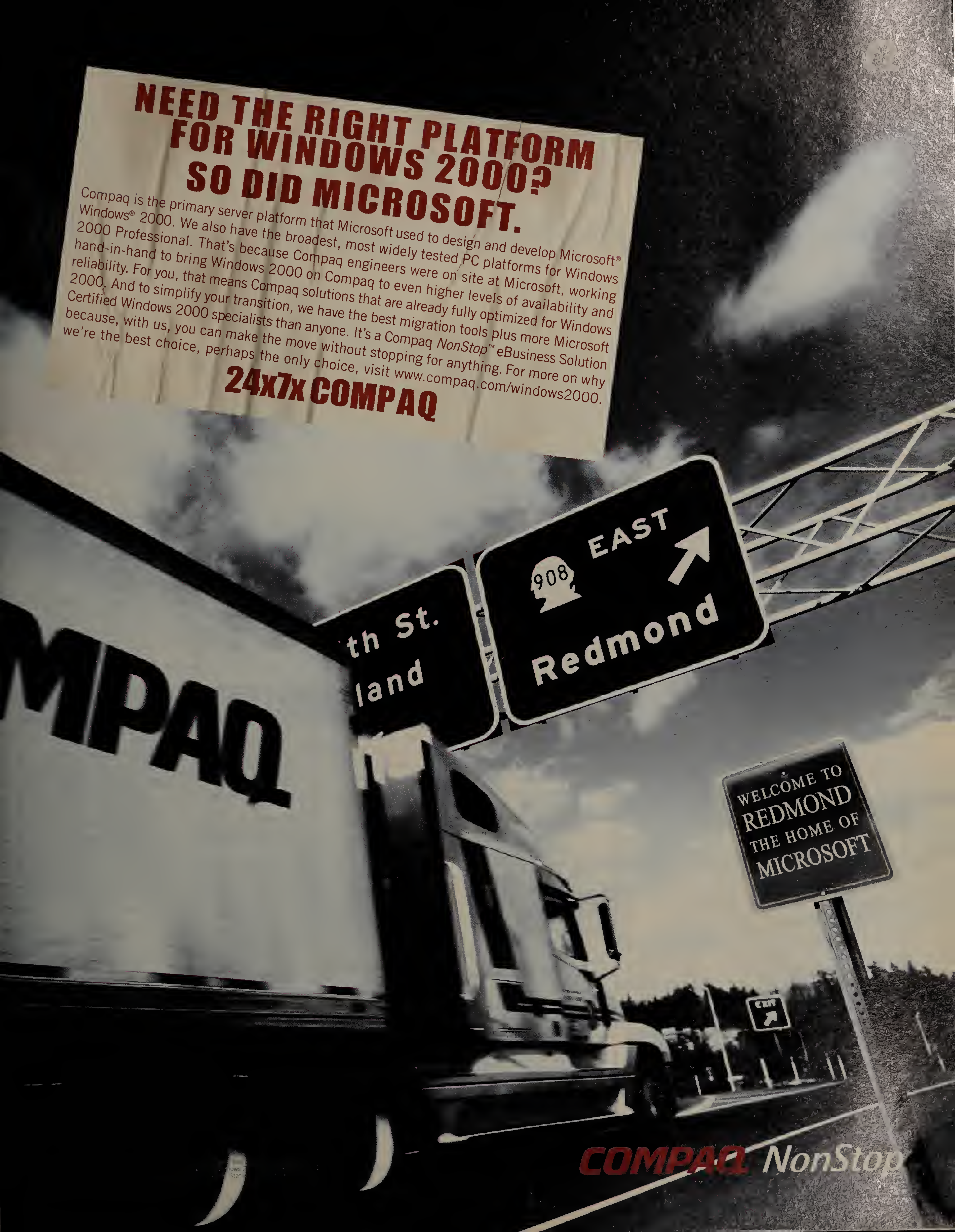
The price is defined as the sum of the cache's list price, plus the cost of all the network gear required to achieve the peak request rate. Network gear costs usually contribute less than 20% to the total price.

IMimic'S DataReactor 5000 showed the best return per dollar, followed by the low-end IBM 3500 M10 in second place and the Quantex 4000 and Dell 130B in a tie for third. Cisco's Cache Engine 7300 came in last; its raw throughput was actually a strong second among all vendors, but its total price of nearly $131,000 dragged down its "per $1,000" rating. Cisco's $44,470 Cache Engine 590 came in next to last, followed by Pionex PCA-1000.

Products showing good return on a dollar can be found in all market segments. For example, the $2,300 Swell Tsunami CPX-1000, the $20,000 Lucent IPWorX WebCache 100 and the $50,500 InfoLibria DynaCache X1 cluster all show similar price/performance returns.

Products from a single vendor tend to yield similar performance/price ratios, implying a consistent, performance-dependent pricing policy. Take InfoLibria, for example. The high-end DynaCache X1 cluster is a little more than twice as expensive as the mid-tier DynaCache 30i and gets a peak throughput that is two and a half times higher. Because the normalized throughput rating stays rel-

Continued on page 64



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Continued from page 62

atively the same, a buyer can justify the higher price if he needs the added throughput.

Hitting the ratios

A second important measurement is the hit ratio. This is a standard measurement of a cache's performance, and it quantifies the bandwidth savings on the outbound network link. For example, with a 50% hit ratio, half of the objects requested by the clients will be served from the cache and will not use the outbound bandwidth.

Hit ratio is also related to request response time of the proxy cache because misses take longer to complete than hits. Misses are fetched from the origin or Web servers, but hits come directly from the cache itself, which in a corporate setting is typically located as close as possible to the clients.

With our simulated Web traffic workload (see www.nwfusion.com, DocFinder: 7623), a cache cannot achieve a hit ratio higher than 55%. The actual measured hit rate may be lower due to a whole host of reasons, such as server overload, insufficient disk space and deficiencies in an object replacement policy. While some real-world installations can see hit ratios approaching 70%, most correctly configured caches will report ratios close to 55%.

In our first bake-off, we found that most vendors were sacrificing other performance factors to achieve close-to-ideal hit ratios. But in this round, many vendors chose to sacrifice hit ratio in exchange for higher throughput (See graphic, below). For example, a box may be able to achieve 100 requests per second throughput with a 50% hit ratio. Cache misses force delays, so if a product's hit ratio goes down, its response time goes up. But that same box could probably get 125 requests per second with a 35% hit ratio.

Squid Version 2.4 and Swell's Tsunami CPX-1000 — a Squid-based product — scored perfect document hit ratios. Cisco's Cache Engine 590 was a close second at 54.8% and Cisco's Cache Engine 7300 was third at 54.5%. Also scoring above 52% were Pionex, iMimic, Compaq's TaskSmart C2500 and Lucent's IPWorX WebCache 150 products.

The Stratacache F100 and InfoLibria DynaCache 30i finished last with 32% hit ratios.

There is no universally acceptable hit ratio, and there are a host of reasons a product could fall below the pack. For example, some products may be designed to stop caching data if the load is too high. Some simply may not have enough disks to store the amount of data required to reach the 55% level.

The fact remains, however, that with fewer hits, you will need more outbound network bandwidth and more proxy resources to handle the same load. Your users may also notice slower response times.

You have to decide what's best for your network. If a product does not meet your criteria, you can work with a vendor to add more disks or adjust other configurations. However, such adjustments may not always be possible (a product may not be able to handle more disks due to RAM, CPU or even licensing constraints) and are often costly.

Cache age

One way around the issue of insufficient disk space is to make sure that the cache purges objects on an appropriate basis to make way for incoming fill traffic. Our Cache Age measurement (See graphic, below) shows an estimated maximum age an object reaches before it gets dumped from a cache. A higher score means a device can store "older" objects and hence have a better chance of producing a hit.

Most of the products can store no more than a few hours of peak fill traffic. In an effort to improve throughput/price ratios, many vendors designed or configured their products to deliver the highest request rate at minimum disk storage costs. Consequently, their boxes do not have enough storage space to keep objects longer than a few hours. The boxes that fell into this category include Stratacache's F100, IBM's 3500M10, Compaq's TaskSmart C900 and Dell's PowerEdge 130b.

Other caches — such as Squid, Swell, Lucent's IPWorX WebCache 150a and both Cisco boxes — can hold objects eight to 18 hours.

Many cache administrators believe that a production cache should store two to three days of traffic. That roughly corresponds to five to 10 hours of peak fill traffic.

The cache capacity requirement depends on your environment. When configuring a caching system based on our performance reports, make sure you get enough disk storage to keep sufficiently "old" traffic. You may have to increase the price and recompute performance/price ratios if a product you are considering does not have enough storage. You should also check that the product is actually available with the additional disk space. These adjustments may significantly affect the choice of price-conscious buyers.

Cache age is not a measurement of how stale or fresh objects sitting in a cache may be. In our workload, every cacheable response is static. However, in a production system, the cache would use standard HTTP features to validate and refresh cached objects. We are working on a model that will allow us to integrate a staleness/validation in the PolyMix-2 workload for future caching bake-offs.

Continued on page 66

Hitting the ratios

Hit ratio measures the number of times a cache produces a hit vs. the times it passes the request onto the Web. The higher the hit ratio, the better the performance.

Product	Document hit ratio
Squid	55.0%
Swell Tsunami CPX 1000	55.0%
Cisco Cache Engine 590	54.8%
Cisco Cache Engine 7300	54.5%
Lucent IPWorX WebCache 150a	54.2%
iMimic DataReactor 5000	53.2%
Pionex PCA 1000	52.9%
Compaq TaskSmart 2500	52.7%
Lucent IPWorX WebCache 100	51.1%
Network Appliance NetCache	50.3%
Microbits Intelli App Pizza Box	44.4%
IBM 5600	42.1%
IBM 5000	40.8%
Quantex Microsystems WebXL 4000	40.3%
Compaq TaskSmart 900	38.7%
IBM 3500M10	37.1%
Dell PowerEdge 130B	36.0%
InfoLibria DynaCache X1 cluster	34.4%
InfoLibria DynaCache 30i	32.3%
Stratacache Flyer 100	32.3%

Measuring cache age

Cache age shows the maximum age an object reaches before it is dumped from the cache. A higher score demonstrates better performance because a device that can store an object longer has a better chance of producing a hit.

Product	Cache age
Swell Tsunami CPX 1000	19.1 hours
Squid 2.4	15.6
Cisco Cache Engine 590	11.3
Cisco Cache Engine 7300	8.6
Lucent IPWorX WebCache 150a	8.4
Pionex PCA 1000	7.6
iMimic DataReactor 5000	7.2
Compaq TaskSmart 2500	6.5
Network Appliance NetCache	4.7
Lucent IPWorX WebCache 100	4.3
InfoLibria DynaCache X1 cluster	3.6
InfoLibria DynaCache 30i	3.2
IBM 5000	2.4
Microbits Intelli App Pizza Box	2.4
IBM 5600	2.3
Quantex Microsystems WebXL 4000	2.3
Compaq TaskSmart 900	1.7
Dell PowerEdge 130B	1.3
IBM 3500M10	1.3
Stratacache Flyer 100	1.2

Measuring response time

To measure response time under peak load conditions, we introduced an artificial delay on the server side to see how each product would react. The lower the measurement, the better the performance.

Product	Mean response time
iMimic DataReactor 5000	1.35 seconds
Squid	1.41
Network Appliance NetCache	1.44
Swell Tsunami CPX 1000	1.44
Compaq TaskSmart 2500	1.45
Cisco Cache Engine 7300	1.48
Cisco Cache Engine 590	1.50
Pionex PCA 1000	1.51
Lucent IPWorX WebCache 150a	1.58
IBM 5600	1.65
Microbits Intelli App Pizza Box	1.69
Quantex Microsystems WebXL 4000	1.70
Lucent IPWorX WebCache 100	1.71
Compaq TaskSmart 900	1.72
IBM 5000	1.75
IBM 3500M10	1.78
Dell PowerEdge 130B	1.81
Stratacache Flyer 100	1.89
InfoLibria DynaCache X1 cluster	2.06
InfoLibria DynaCache 30i	3.08

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Measuring downtime

Time to first miss (TTFM) measures how long it takes a cache to recover from an unexpected condition like a power outage. When a cache is able to deliver its first miss, end users are able to access the Web. The lower the measurement, the better the performance.

Product	Time to first miss (TTFM)
InfoLibria DynaCache 30i	0.1 Minutes
InfoLibria DynaCache X1 cluster	0.7
Network Appliance NetCache	1.2
Microbits Intelli App Pizza Box	1.6
Lucent IPWorX WebCache 100	1.8
Lucent IPWorX WebCache 150a	1.8
Pionex PCA 1000	2.2
Squid	2.4
Dell PowerEdge 130B	2.5
iMimic DataReactor 5000	2.9
IBM 3500M10	3.0
Stratacache Flyer 100	4.0
Cisco Cache Engine 7300	4.2
Quantex Microsystems WebXL 4000	4.2
IBM 5600	4.8
IBM 5000	5.1
Cisco Cache Engine 590	6.9
Compaq TaskSmart 900	7.8
Compaq TaskSmart 2500	9.2
Swell Tsunami CPX 1000	n/a

Continued from page 64

Response time

In order to measure the response times of the products under real-world peak load conditions, the PolyMix-2 workload introduces an artificial delay on the server side. The server delays are normally distributed with a 2.5-second mean and a 1-second deviation. The delays play crucial roles in creating a reasonable number of concurrent virtual sessions in the cache.

To simulate WAN server side connections, we introduce packet delays of 80 msec round trip and a .05% packet loss. These delays increase miss response times and, more importantly, reward caches for using persistent connections. (The TCP connection setup phase includes sending several packets that also incur the delay.)

The delays, along with the hit ratio, affect transaction response time. Ideal mean response time is impossible to calculate precisely because the Web model is too complex. With that said, we estimate the ideal mean response time at about 1.3 seconds based on 55% hit ratio, zero delay hits, and 2.6-second misses, factoring in some WAN delays and packet loss.

IMimic scored the best mean response time: 1.35 seconds (See graphic, page 64). Six other products — Swell's Tsunami CPX-1000, NetAppliance's NetCache Appliance 4.1, Squid Version 2.4, Compaq's TaskSmart 2500 and both Cisco products — showed good response times below the 1.5-second mark. Apparently, most vendors have concentrated on keeping response time close to ideal levels, minimizing request processing overheads for both miss and hit paths. The results for both InfoLibria products are noticeably worse than average, ringing in at more than 3 seconds for DynaCache 30i and more than 2 seconds for three-node DynaCache X1 cluster. InfoLibria officials say the products performed poorly on this particular test because of a bug in how the beta software schedules disk I/O requests. They say the bug should be fixed in the shipping product.

As with hit ratio, the absolute value of measured response time does not mean much, as it depends on the artificial delay on the server side. What's really important is the relative difference between measured response time and ideal response time.

Downtime

The downtime test is designed to estimate the time it takes a product to recover from an unexpected condition, such as power outage or software failure. Polygraph measures the time until the first miss (TTFM) and the time until the first hit (TTFH). Lower values are better for both measurements.

From a user's perspective, the TTFM is somewhat more important. As soon as caching systems can deliver misses, users can access the Web again. Delivering hits is important in reducing outbound bandwidth usage, as hits usually do not consume outbound bandwidth, and from a quality-of-service point of view, as users get pages "faster."

All products tested with the exception of Swell's Tsunami CPX-1000 were able to complete the test. The Swell product required manual intervention to reboot (pushing the power button) because the BIOS would not allow for an automatic boot after the power has been turned back on. Such an intervention was prohibited by the bake-off rules.

InfoLibria Dynacache 30i scored a near perfect rating (See graphic, left), which can be attributed to the DynaLink component of the product. In case of power failure, DynaLink switches into hard bypass mode, essentially replacing a cache with a piece of wire.

InfoLibria's three-node X1 cluster, the only product using a Layer 4 switch as its base included in these tests, finished second. TTFM for a Layer 4-based cluster is the time it takes for the switch to boot and detect that a proxy is not yet ready to respond.

For systems with large amounts of RAM and/or many disks, TTFM depends primarily on how much various housekeeping operations are optimized or completed in parallel. For example, scanning 4G bytes of RAM twice or spinning all 10 SCSI disks sequentially significantly increases TTFM readings. Most entries show negligible delay between the time until the first miss and the time until the first hit.

In addition to InfoLibria's device, Network Appliances' and Microbits' scored well on this test. The two Compaq devices scored the worst, followed by Cisco's Cache Engine 590.

This review presents a performance snapshot of the caching industry as of January 2000.

Naturally, all bake-off participants are working to fix the problems revealed by our testing and on improving the products' overall performance. The products may be retested at the vendors' request, and you can expect to see the new results published on the IRCache site. And we're planning a third bake-off this summer.

The authors are employed by the University of California, San Diego, and together they comprise the IRCache group, which finds its roots in National Laboratory for Applied Network Research. They work in Boulder, Colo.

Rousskov is the author of Web Polygraph, and he can be reached at rousskov@ircache.net. Wessels is the creator of the IRCache group and the author of Squid caching proxy, and he can be reached at wessels@ircache.net. Chisholm works on various IRCache projects, including Polygraph tools and Squid performance optimization, and he can be reached at chisolm@ircache.net.

How we did it

We used approximately 100 PC's to drive the tests. These were Compaq Deskpro EN systems with 450-MHz processors and 256M bytes of RAM. All the machines ran FreeBSD-3.3 as the underlying operating system and IRCache's Web Polygraph 2.2.9 test software (polygraph.ircache.net) to generate HTTP requests and responses.

Each machine was identically configured, except for its IP address. One pair of these machines generated up to 400 HTTP requests per second. All the Polygraph PC's used dual-mode 10/100 network interface cards and all were running at 100 M bit/sec across the network. Other network gear, such as hubs and switches, varies from bench to bench as each vendor was responsible for bringing its their own network gear to tie the network together.

Each product underwent three tests: Maximum Segment Lifetime (MSL), PolyMix-2 and downtime.

The MSL test ensures that the product keeps recently-closed connections in the TIME_WAIT state for at least 60 seconds. Why is this important? A product may be able to achieve higher performance with a lower setting because resources (TCP control blocks, for example) would be released more quickly.

PolyMix-2 was the most important test in this suite because we used it to collect all performance data. Before running a PolyMix-2 test, we filled each cache. Reporting the performance of a cache that starts out empty is worthless because production caches are full during normal operation. To fill the cache we first flush it, and then run the Polygraph traffic generator so that the amount of cacheable miss traffic is at least twice the cache size. All the measurements reported in this article are taken from the second half of the 14 hour PolyMix-2 test (See time chart, page 64).

With the downtime test, we found out how quickly a product recovers from a loss of power or a hardware/software reset. While Polygraph requests objects at the rate of three per second, we turned off power to all of the vendor's equipment, including the networking gear. After five seconds, power is restored and we started a timer. We measured how long it took each cache to serve its first miss and its first hit.

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FEATURE: *PUTTING*

WIRELES

University of Pennsylvania gives top honors to Cisco gear for campuswide deployment.

BY BETSY HARTER

The University of Pennsylvania's network already serves 40,000 users in 200 buildings, but soon its reach will extend even farther thanks to wireless equipment that provides mobile connectivity from anywhere on the Philadelphia campus.

Deke Kassabian, technical director for the school's Network Engineering, Systems and Services department, has been tracking the IEEE 802.11 wireless standard for some time. A new high-rate extension to that standard, 802.11b, supports wireless speeds up to 11M bit/sec. Once the network group believed the standard was reliable and mature, it decided to try the technology.

IT realized that wireless technology could be useful in several places around the campus. For instance, a short-range wireless link might be able to provide point-to-point wireless access to some locations that the school's PennNet network doesn't reach.

Wireless also might be able to connect areas where traditional structured wiring is not suitable. For example, the open interior of the school's Furness Library incorporates old stone and metalwork. Currently, fiber runs from the building's basement to the first floor, but adding wall plates and desktop connections would require drilling unsightly holes through stone, brick and iron, Kassabian says.

Moreover, Penn sets up a temporary ID processing center in a gym every year for new students. A wireless LAN might be ideal for short-term networks in such cases.

Evaluating the options

Kassabian worked with Eric Snyder, senior systems programmer; Kristina Victoreen, senior network engineer; Andy Diller, systems programmer; and Bill Magill, senior systems programmer, to evaluate wireless systems.

The team bought 802.11- and 802.11b-compliant equipment from several vendors, including access points and PC cards from 3Com, Apple, Cabletron, Cisco and Lucent (see graphic). It also tested Farallon Computing's 2M bit/sec Skyline Wireless PC Card but ruled out the product because it was expensive and didn't support the new 802.11b 11M bit/sec operation, Kassabian says. However, Farallon is scheduled to release an 11M bit/sec version of the Skyline Wireless PC Card this month.

Last September, the group began evaluating several aspects of wireless equipment. With the access points, the

HOW THE WIRELESS WARES COMPARE

Here is the University of Pennsylvania's Network Engineering, Systems and Services group's assessment of the wireless equipment it evaluated.

COMPANY: 3COM

Products:
AirConnect access point: $1,195
AirConnect Wireless LAN PC card: $219
Starter pack of one access point and three cards: $1,795

Web address:
www.3com.com/mobile/wireless/solution.html

Strengths:
- Easy to set up.
- Good management capabilities.
- In areas where there is no power outlet, the system lets you run power to the access point over unused network lines.
- Comprehensive, user-friendly client tools.

Weaknesses:
- Cumbersome telnet/serial interface.
- Lacks syslog support.
- Clients and access points can't support MacOS or Linux.

COMPANY: APPLE

Products:
AirPort Base Station: $299
AirPort Card: $99

Web address:
www.apple.com/airport

Strengths:
- Solid performance.
- Good interoperability.
- Priced attractively.

Weaknesses:
- Poor scalability.
- Confusing setup.
- May create Dynamic Host Configuration Protocol problems.

COMPANY: LUCENT

Products:
Orinoco WavePoint-II access point: $995
Orinoco PC Card: $179

Web address:
www.lucent.com/wirelessnet/products/solutions/wavelan.htm

Strengths:
- Supports multiple P single access point.
- Supports many diffe operating systems.
- Good technical supp

COMPANY: CABLETRON

Products:
RoamAbout Access Point 2000: $999
RoamAbout Client card: $199

Web address:
www.cabletron.com/download/download.cgi?lib=roam

Strengths:
- Strong support for multiple operating systems.
- In areas where there is no power outlet, the system lets you run power to the access point over unused network lines.

Weakness:
- Poor management interface.

S *to the* TEST

Weakness:
- Lacks console port.
- Access point doesn't support telnet or Web management.
- Poor interface for Macintosh computers.

COMPANY: CISCO

Products:
Cisco Aironet 340 Series Wireless Access Point: $1,299
Cisco Aironet 340 Series Wireless PC Card: $249

Web address:
www.aironet.com/products/antennas/access _point_ant.asp

Strengths:
- Flexible management options.
- Strong logging, security and Management Information Base support.
- Provides good view of signal strength and signal quality.

Weaknesses:
- Limited support for non Windows operating systems.
- Web interface could use improvement.

primary focus was on setup and configuration.

However, the school also sought solid management and monitoring features and the ability to manage access to the devices.

With the client-side tools, which encompass PC cards and the full set of associated software, the network staff's criteria included support for multiple operating systems, signal monitoring, and easy setup and operation.

The department also looked for feedback from the user interface, which lets IT know at what frequency and over what channel the user has connected, and good site-survey tools. Site-survey tools help engineers test the efficiency and effectiveness of access points in various locations. Once an access point is in place, an engineer can plan wireless coverage by running the site-survey tool on a laptop and viewing interference as well as the access point's signal strength and quality.

IT set up the access points in its lab, then tried to get each vendor's wireless LAN card to associate at 11M bit/sec with access points from all other vendors in order to see what happened when it crossed vendor lines. After achieving interoperability in every case, Penn's network pros tested the hardware's network management capabilities.

Team members documented the products' strengths and weaknesses, along with any surprising results. What's more, staffers examined, but did not specifically test, each device's wired equivalent privacy (WEP) capabilities, which protect against eavesdropping and unauthorized network access. All but 3Com's AirConnect access points had reasonable WEP support, though 3Com is scheduled to add WEP support this month.

After comparing the test results, the school's IT department recently decided to deploy the Cisco Aironet 340 Series Wireless Access Points and Cisco Aironet 340 Series Wireless PC Cards for production use.

Penn rolled out four access points and 35 cards in February and is awaiting the delivery of four more access points and 30 cards. If all goes well, Kassabian hopes to deploy wireless gear in seven to 10 more locations by June.

Cisco got the nod because of its flexible management options, access security, and ability to set alarms and log error thresholds. What's more, the system provides a good view of signal strength and quality.

But there's one drawback: Cisco doesn't support Apple PowerBooks. For those, Kassabian says the Lucent PC card is the only real option. Still, the card isn't ideal for the Macintosh environment and often requires rebooting.

The university doesn't plan to use the Lucent access points. IT wasn't impressed with the Lucent product, primarily because it lacks a console port and because the management tools only run on Windows operating systems. While Windows is popular, many other operating systems are used on campus.

Penn worked with value-added reseller Armstrong Microsystems of Kittanning, Pa., to implement the Cisco wireless gear. Brent Hester, general manager of Armstrong Microsystems, says that of the products Penn tested, the Cisco access points and cards seem to provide the most versatility. "They are probably the most easily managed products for an enterprise wireless network," he says.

Hester says the Cisco wireless gear will let Penn provide mobile access to PennNet from anywhere on campus.

Room for improvement

Yet Kassabian notes that even his top choice could use some enhancements.

"The weakest feature of the management interface is the graphics," he says. "Even in the Web interface, the graph uses ASCII symbols and the axes are sometimes severely misaligned. These graphs are not very readable, so most people will want to use some other network-management tool in order to view statistics for anything beyond a quick look."

In addition, IT would welcome Macintosh support in Cisco's PC cards.

While Cisco had a slight edge over most of the other products in terms of access control and traffic statistics, Kassabian says 3Com's AirConnect was a close second.

"We like 3Com's access point and site-survey tools very much, but we think the product needs a bit more maturity in the WEP and client OS support areas," he says. "We'll continue to work with AirConnect and may use it in the future."

One way all the wireless vendors could improve their equipment would be to use Remote Authentication Dial-In User Service (RADIUS) for authentication and authorization. Access control to wireless networks based on RADIUS would make for tighter integration and easier deployment, Kassabian says.

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A SPECTRUM OF SPENDING

Full details: Read Penn's entire evaluation of wireless LAN gear.

Looking forward: What's next in the world of wireless?

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Taking the job public

Network professionals discuss how their jobs in the public sector compare with previous posts in the corporate world.

BY DAVID RATHS

A widespread notion about working for the government or a university is that the pace is slower, the bureaucracy stifling and the technology outdated. But some network executives who have made the switch from the private sector say those are misconceptions.

For example, many IT professionals say universities offer a great opportunity to work with and research new technologies. Gary Corbett, director of telecommunications and network services at Northwestern University in Evanston, Ill., also says there's plenty of work to keep his 65-person IT staff busy. "It's even more difficult than in a corporate setting because at least at most offices, people go home at night," he says. "A university has people working and studying all night long, and IT must work around that."

And while it's generally true that salaries are lower in the public sector, the three IT workers Network World *interviewed all got raises when they switched over from corporate jobs. The profiles below highlight some of the reasons they made the move.*

NAME: BRENT BARTON
Job: Senior LAN administrator
Employer: Public Employee Health Plan, State of Utah
Length of time in current position: Since November 1999
Most recent job in the private sector: Web site manager/ IS manager, Simmons Media Group in Salt Lake City, August 1985 to November 1999.

Reason for changing jobs: More opportunities, more compensation, better benefits. At his pension plan introduction, Barton learned that if he retired at age 56, every year thereafter he'd get 60% of the average of his highest three years' salary. "I thought, 'I don't ever want to leave,' " he says.

How the public sector differs: There was more job stress in the private sector and too much emphasis on the bottom line. "It was very difficult to get more resources and more people," he says.

Barton describes his former employer as "old school" and says he felt pigeonholed. "We just had Novell and a few Internet technologies to work with. Here, there's also Linux, mainframes, NT — there's a lot to learn." But he is quick to note that his friends who work for dot-com firms don't face the same kind of restraints he did. "They're all about technology."

Best thing about current job: The workload is more reasonable and the compensation is higher than at his previous job.

Worst thing about current job: Can't wear shorts to work anymore.

Would you ever return to the private sector? Yes, to get back to a faster pace and to wear shorts again!

NAME: TONY CARDENAS
Job: Network services manager
Employer: Oregon Public Education Network, State of Oregon
Length of time in current position: Since January 2000
Most recent job in the private sector: Senior network engineer, The Network Group (now Infogroup Northwest), a network integrator in Eugene, Ore., November 1991 to November 1995.

Reason for changing jobs: Former position required too much travel, long hours and time away from family.

How the public sector differs: Burnt out by 80-hour workweeks with a network integration firm, Cardenas took a job as network administrator for the Tillamook School District on the Oregon coast. He helped create one of the most wired school districts in the state, but this was no easy feat.

"The lack of business sense in public education makes it hard to accomplish things," he says. For example, Cardenas says that in a school district special interests often prevail over business sense.

Best thing about current job: Great opportunity for experience, exposure, skill building, and best of all, I can be with my family.

Worst thing about current job: Highly political.

Would you ever return to the private sector? Yes, but not for a consulting firm or network integrator.

NAME: GARY CORBETT
Job: Director of telecommunications and network services
Employer: Northwestern University, Evanston, Ill.
Length of time in current position: Since August 1996
Most recent job in the private sector: Systems engineer, federal government group of Motorola in Washington, D.C., June 1984 to March 1987.

Reason for changing jobs: Personal reasons.

How the public sector differs: Before taking a job at Northwestern, Corbett spent seven years as director of telecommunications at the University of Maine in Orono. The advantages of working for a university are that "it's not subject to any business cycle and you're not going to get downsized or right-sized," he says. When he worked at Motorola, he says he sometimes felt like salespeople controlled engineering decisions.

Best thing about current job: Diversity of technology, fast pace of change, job stability.

Worst thing about current job: Cold Illinois winters.

Would you ever return to the private sector? No, not as long as my job remains challenging.

Raths is a freelance writer in Kailua, Hawaii. He can be reached at draths@hawaii.rr.com.

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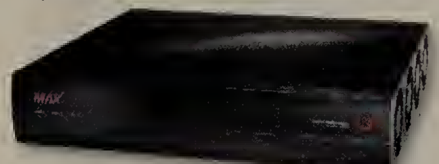

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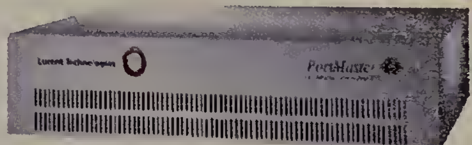

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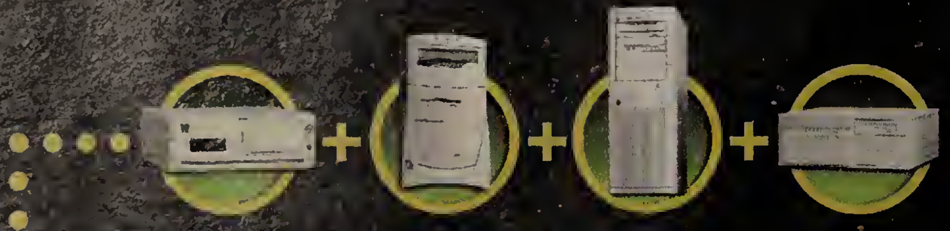

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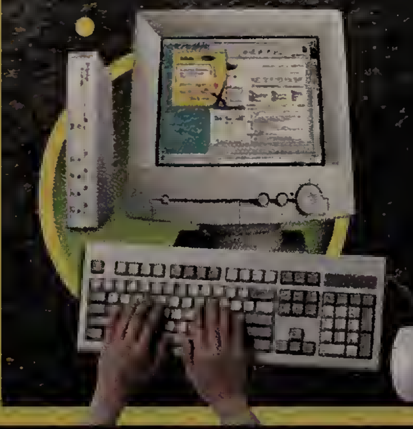

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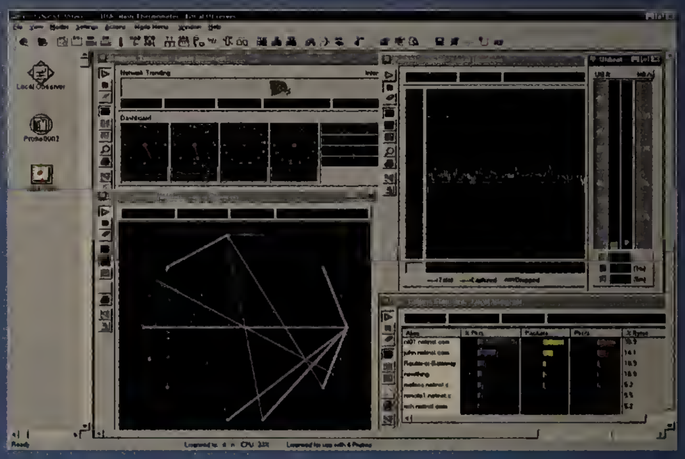

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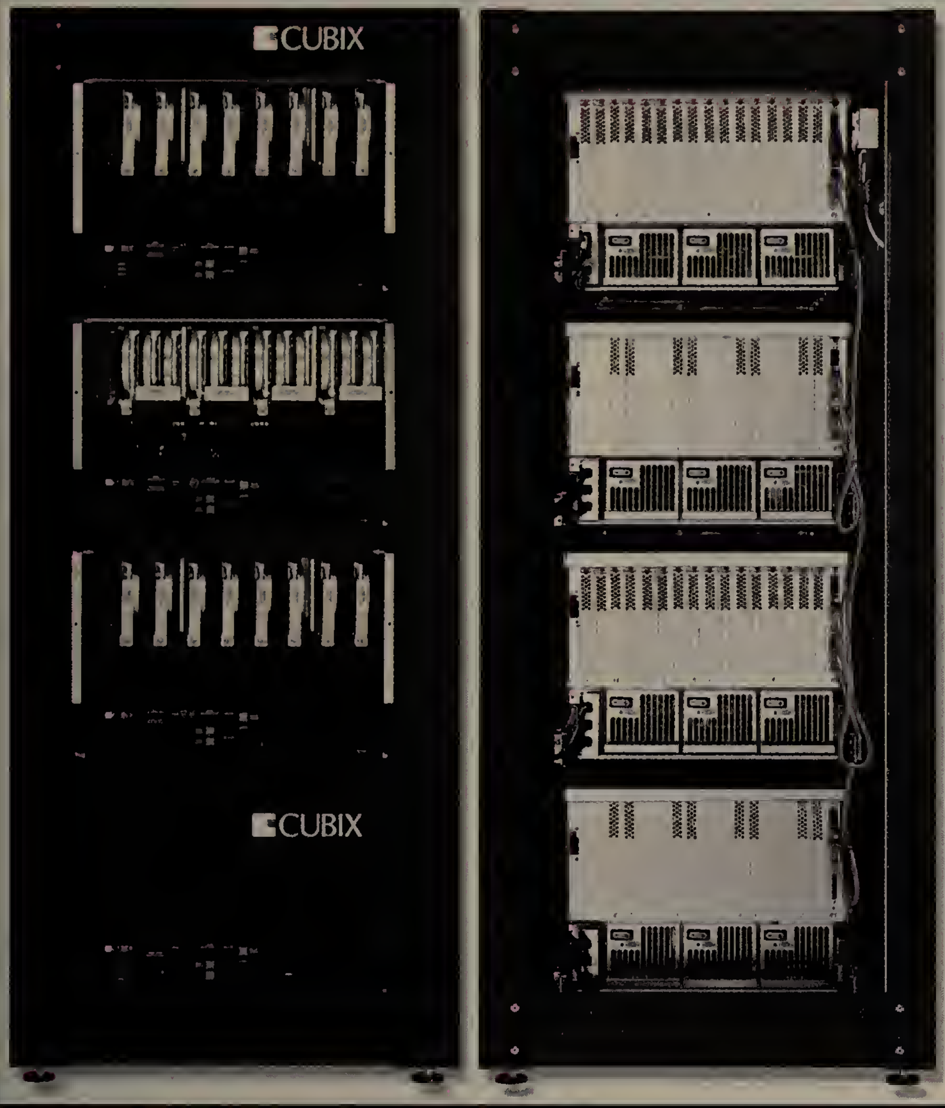

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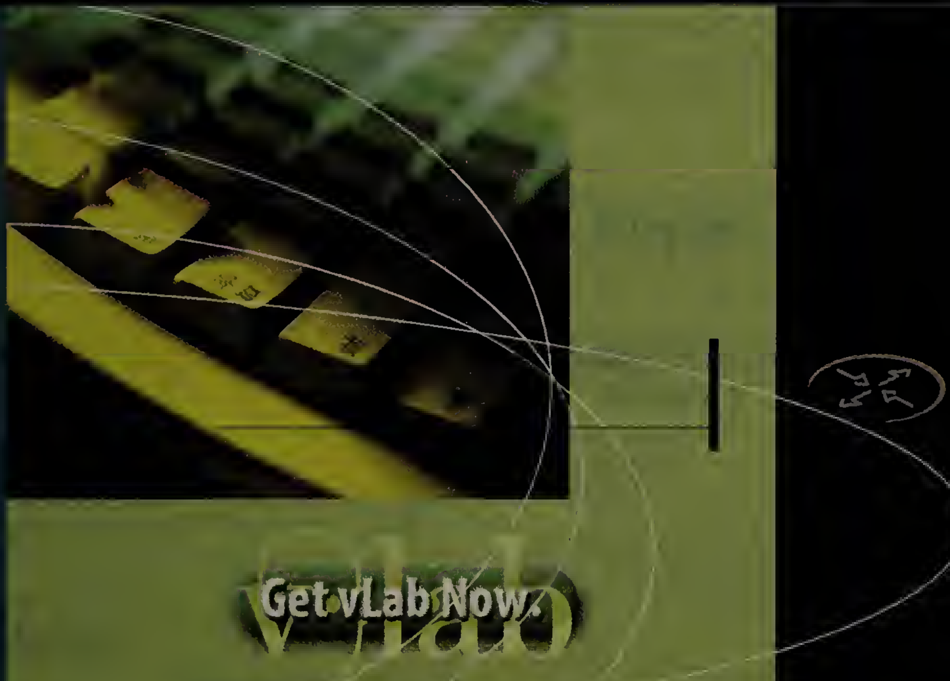

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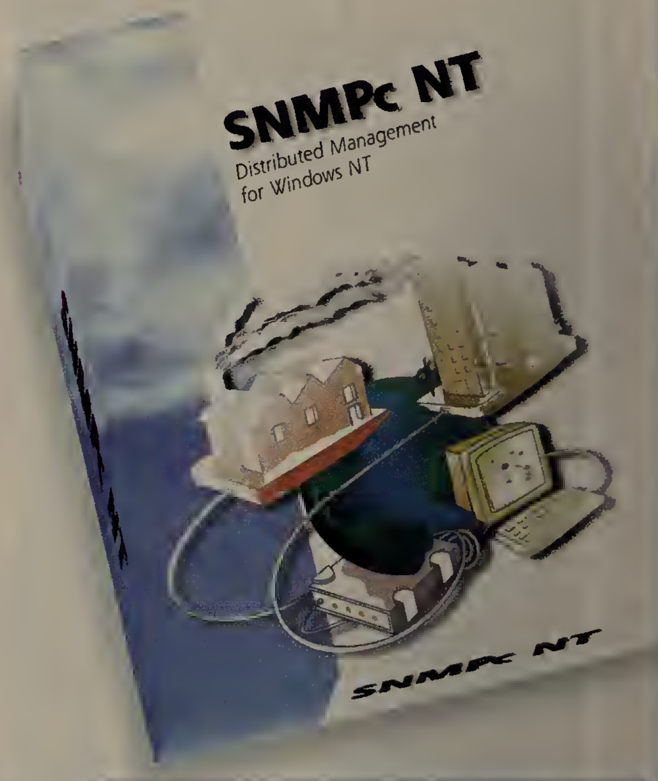

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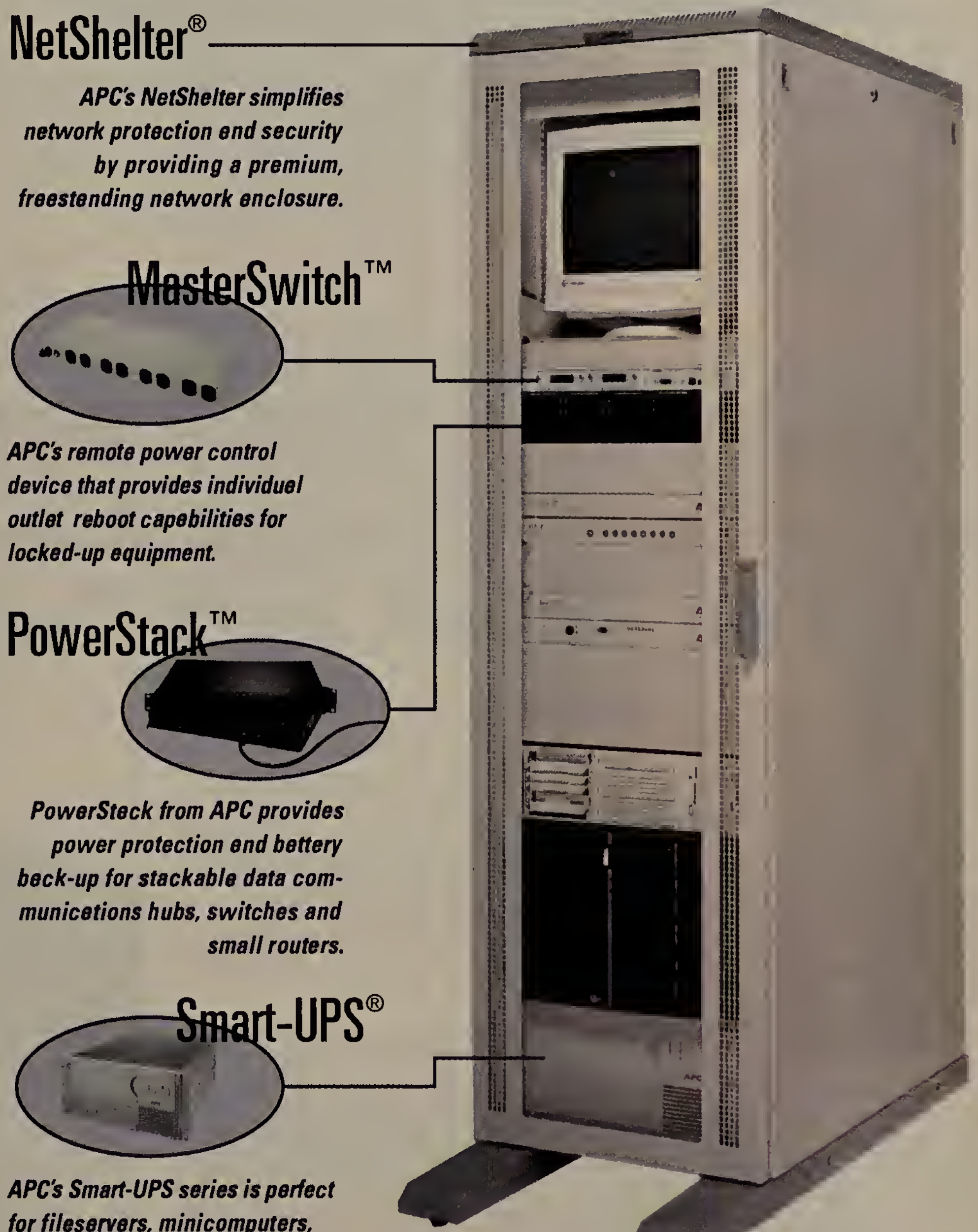

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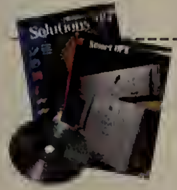

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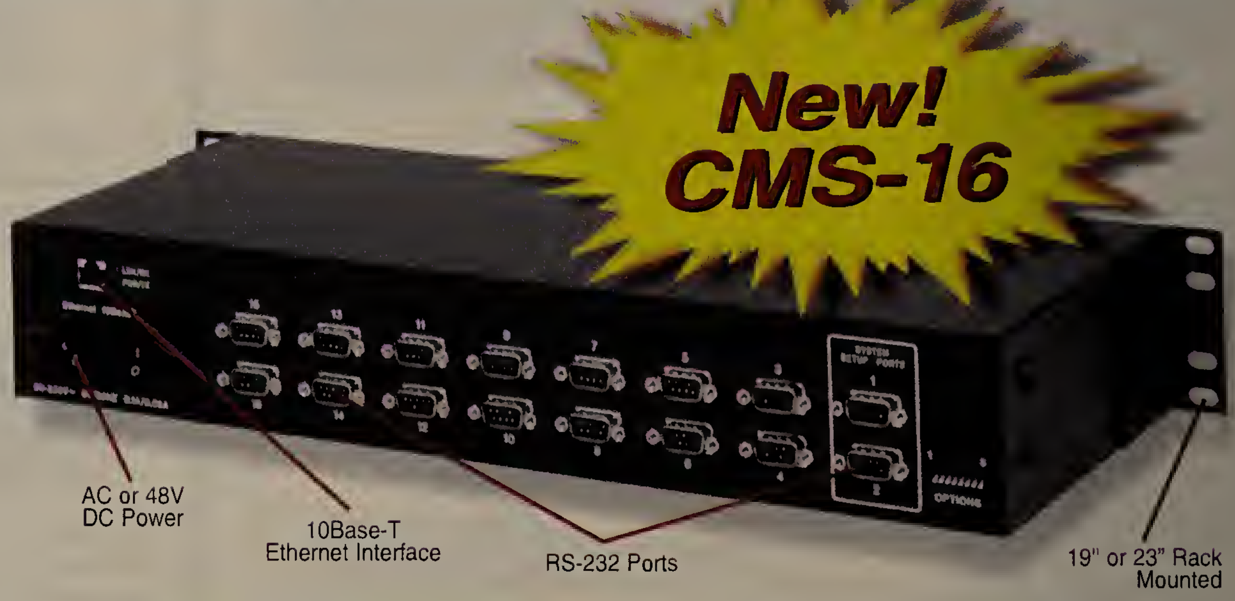

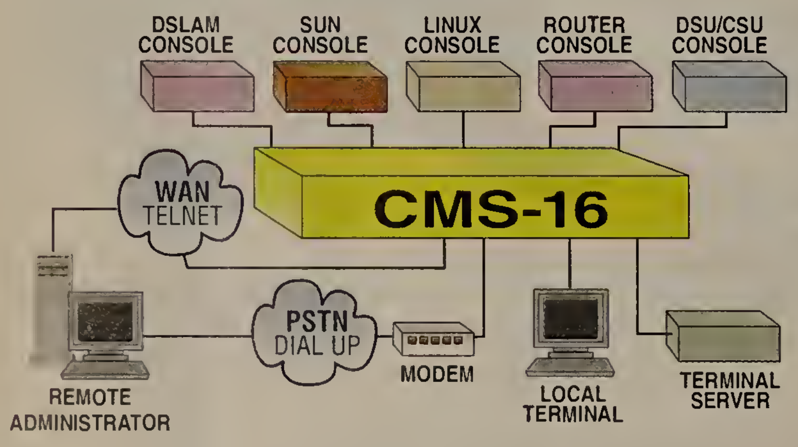

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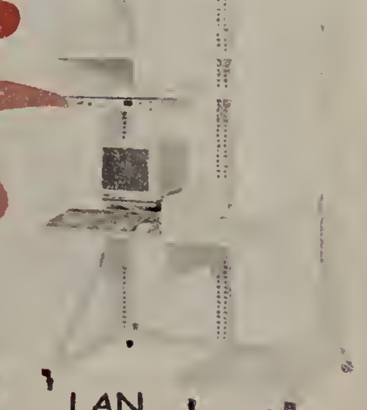

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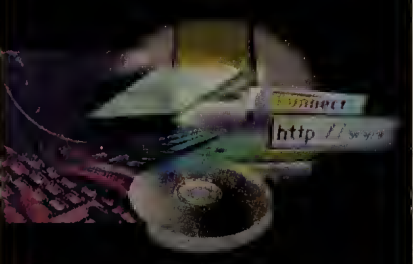

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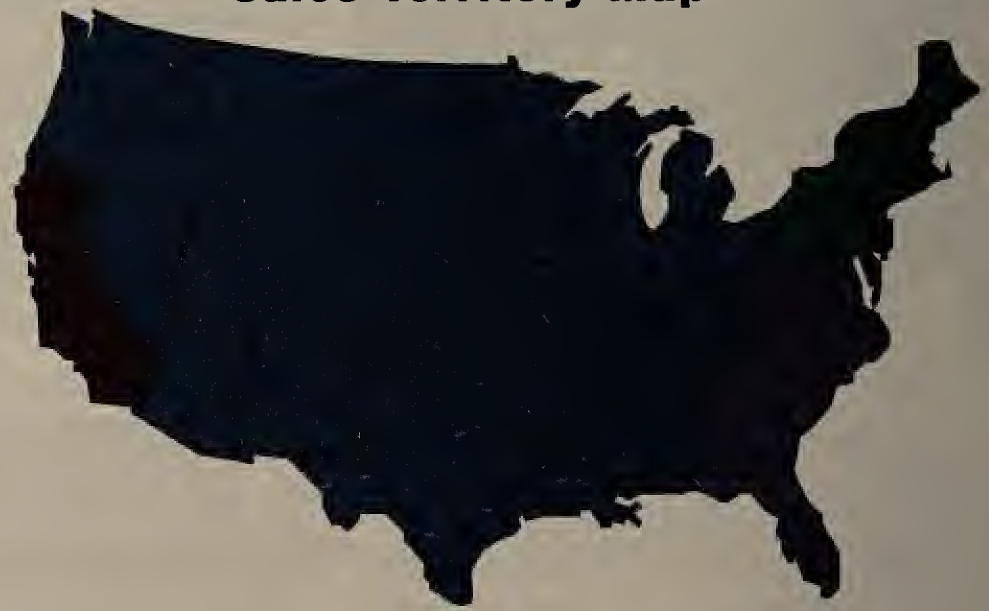

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MJ Technologies of NJ, Inc. is seeking experienced professionals with the following skills:

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- HTML, Corba, Perl, CGI, RMI, IIS, MTS, KIVA.
- Oracle, Sybase, Corba, VC++, MFC with COM/DCOM, SOL, VB, ActiveX, PB, C, C++ on Unix/NT.
- HP-UX, Sun Solaris, Linux, AIX, Networking, Win-NT, DB2, UDB, Oracle, Sybase, Informix, SOL Server Administrators.
- Datawarehousing and ERP having ORACLE Financials, PeopleSoft, CRM, Baan.

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Please respond to: HR Dept., MJ Technologies of NJ, Inc 762 Green St., Ste 2C,Iselin, NJ 08830 Tel: (732)855-1194 Fax: (732)855-7911 Email: hrdept@mjtnj.com

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SENIOR SOFTWARE ENGINEER to provide on-site consultancy in object oriented design and analysis for various software systems to allow visualization and monitoring of movable machinery using wireless communications protocols (WAP) and heterogeneous network operating systems; provide related architecture, database design and integration; design, write and test server-side Microsoft COM objects on Windows NT using Microsoft 11S, Unified Modeling Language (UML) with Rational Rose, Microsoft J++, XML/XSL, Microsoft COM/MTS architecture, HTML, Visual SourceSafe, Microsoft SOL Server, Authentication and Authorization, Site Server eCommerce Pipeline, Centralized Logging and Alerting System (CLAS), Microsoft Data Transformation Services (DTS) and SOL Stored Procedures. Require: M.S. (or equivalent) in Computer Science/Electrical Engineering and two years experience in the job offered or any experience providing skills in described duties. 40% travel to client sites within the United States required. Salary: $69,000 per year, 8 am to 5 pm, M-F. Apply with resume to: H.R. Manager, 4C Solutions, Inc. 4601 Six Forks Road, Suite 500, Raleigh NC 27609

SOFTWARE ENGINEER: Proven ability in using SOL Windows and Power Builder to design and develop client server applications using the object oriented technology. Ability in using Microsoft Visual Basic to design and develop client server applications using the COM architecture, ActiveX technology and Microsoft Universal Data Access methods. Experience in developing queries, stored procedures, database triggers and fine tuning of SOL using Gupta SOL Base on Novell NetWare, Sybase SOL Server's Transact-SQL and Oracle's PL/SQL on HP UNIX. Working knowledge in using Erwin Database designer and easy case tool to produce Entity relationship diagrams(ERD), Data flow diagrams (DFD) and functional Hierarchy diagram. Job duties are Analysis of current procedures and problems to refine and convert the data to programmable form; determine output requirements; study existing systems to evaluate effectiveness; upgrade systems presently in use; develop, test and implement new software; correct systems/ programs as necessary. Requires Bachelors in Engineering with 2 yrs of software development experience. 40 hours per week at $ 70,000 per year. Please send resume to Case # 19990800, PO Box # 8968, Boston, MA 02114.

Adil Business Systems Inc, a NY IT Co, is looking to fill the following positions at their work sites at NY, NY:

Programmer Analyst-Bach deg in engg (any), math, science +2 yrs exp in job (or) 5 yrs exp in job. Must have exp in MS-ACCESS, MS-EXCEL, Win NT, ORACLE, C, UNIX.

Programmer Analyst-Bach deg in engg (any), math, science + 2 yrs exp in job (or) 5 yrs exp in job. Must have exp in Visual C++, SDK, Win NT, Visual Basic.

Network Analyst/Engineer-Bach deg (any field) + 2 yrs exp in job offd. Must have exp setting up NT servers, Win NT n/work, Win NT Server, workstations, Win 98/, n/work printers & switches, & Microsoft Office.

Software Engineers: Must have exp in using UNIX, C/C++. Masters in Elect/ Comm, Eng, Comp Sci, w/2 yrs exp (or) Bach w/5 yrs exp/dsgn & dvlp, various s/ware applics using Unix, C, C++, Sybase & CASE tools.

Send resumes to Adil Business Systems, Inc. 75 Willets Dr, Syosset, NY 11791.

Translator.Perform tech'l writing & translation of adv'd banking sftware documentation from Eng to Greek, French & Italian under win 95/nt, adobe framemakr, acrobat, robohelp, winhelp, html, power pt, resource wkshp, corelldraw, thumbs+, word, access, amipro, excel, outlook, schedule+, lotus 1-2-3, intrnet & intrnet db mining environ; prep layouts of instructional manuals & materials for sftware sys, compile prgrmr & testers' notes into sftware release notes, recom'd & implem't tech'l translation staff policies, procedures & writing style; create new graphic & CD covr designs & on-line scrn icons & appropriate instruction keys; intervw, train, provide & present corp image guidelines in multi-lang sales seminars to tech writers & int'l clients; create on-line tech document'n & co's news flash for intrnet distrib & pub; dev document'n in multi-mdia formats, prints, & electronic formats; coord printing, binding & production of sftware prod's & pub of docs re thereto.40hrs/wk, 8a-5p, M-F, BA Lang Interpretation & Translation, 2yrs exp in job offered, must write, read & spk Eng, Grk, Fr & Ital, $36,596/yr. Resume to JOFL2058199, Dept.of Labor/Bureau of Workforce Progm Support, PO Box 10869, Tallahassee, FL 32302

SOFTWARE ENGINEER: ORACLE Designer/2000 to produce Entity Relation Diagram (ERD), Data Flow Diagram (DFD), data Diagrammer (DD) and Functional Hierarchy diagrams. Also should have sufficient knowledge about Reverse Engineering. ORACLE Database Administrator to perform various databases administrative work in 2-tier and 3-tier client server environment. Should have sufficient knowledge regarding oracle enterprise manager, platinum DBA. Installing/maintaining Peoplesoft databases in 2-tier and 3-tier architecture. Sufficient knowledge regarding Tuxedo and Redpepper m/c is required. Job duties are Analysis of current procedures and problems to refine and convert the data to programmable form; determine output requirements; study existing systems to evaluate effectiveness; upgrade systems presently in use; develop, test and implement new software; correct systems/programs as necessary. Requires Masters in Math (or), Physics (or), Chemistry (or), Computers with no experience required. 40 hours per week at $ 72,000 per year. Please send resume to Case # 19983618, PO Box # 8968, Boston, MA 02114.

Senior Software Engineer - Aid in the development of a worldwide showcasable information warehouse. Perform client/server applications development which utilizes web based user interfaces. Responsible for the logical and physical design of Oracle databases; define, design and code SOL stored procedures and packages used to manipulate data from source transaction systems. Design and code extract and load procedures using SOL Loader and PL/SOL; design and code large scale client/server application systems. Requirements include a Master of Science Degree or foreign equivalent in Computer Science or Computer Engineering or Industrial Engineering with at least two years of experience in job offered or related field of software engineer. Knowledge of: C, UNIX, Shell Scripts, Oracle, PL/SOL, SOL Loader, Stored Procedures, Database Design Methodologies/Architectures, Web based Technologies and Client/Server Applications. Applicants must have unrestricted authorization to work in the United States. Salary $73,008/year. 40 hours/wk. Respond with two copies of resume to Case #19990178, P.O. Box 8968, Boston, MA 02114

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SOFTWARE ENGINEER: Proven ability in using Oracle Tools Oracle Developer (Forms, Reports and Graphics), Oracle Case*Tools, Oracle Designer, SOLPLUS, PL/SQL and SQL Loader. Proven ability in using Oracle Pre compilers (Pro*C), User Exits, Foreign function interface (ORA FFI) and Oracle Call Interface (OCI). Demonstrated ability in designing applications, user interfaces, developing store packages, procedures, functions and database triggers. Proven ability in fine-tuning and optimization of SOL and PL/SOL program units for server end processing. Job duties are Analysis of current procedures and problems to refine and convert the data to programmable form; determine output requirements; study existing systems to evaluate effectiveness; upgrade systems presently in use; develop, test and implement new software; correct systems/programs as necessary. Requires Masters in Computers with no experience required. 40 hours per week at $ 76,000 per year. Please send resume to Case # 19990936, PO Box # 8968, Boston, MA 02114.

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SOFTWARE ENGINEERS (6 positions): require Bachelor's in Engineering/Computer Science/Mathematics/Science or closely related field with two years experience providing skills in described duties, at $65,000 per year; Senior Software Engineers (4 positions) with Master's and two years experience, at $70,000 per year. Provide on-site consulting in design, analysis and development of software applications for legacy systems in IBM mainframe environment; development and administration in Oracle, DB2, SQL Server and Sybase; e-commerce and web applications development in Microsoft, Java and related technologies; network management systems development with Netscape Server and related tools; SAP R/3 applications on Windows with DOS and ABAP/4 and related modules. 40% travel to client sites in the United States. Mail resumes to: YASH Technologies, Inc., 2100 Parklake Drive, NE, Suite F, Atlanta, GA 30345-2167

St. Jude Children's Research Hospital, located in Memphis, Tennessee, is an internationally renowned healthcare institution which combines scientific research and leading edge technology to provide cures for children with catastrophic childhood diseases.

We have recently embarked on an exciting and ambitious series of projects to deploy advanced clinical and research systems to support our patient care and research activities. Our vision is to implement a "paperless" medical records system by the year 2002. New networks, infrastructure, databases and client server tools have opened up exciting opportunities for highly skilled project staff and managers who would like to join our rapidly growing IT Division. As a member of our IT Services team, you will be challenged to work closely with directors, managers and customers throughout the institution as we re-engineer our business, patient care and research operations. Positions are available in the following areas:

- **Technical Project Manager (Job Code: ITC-4730)** 6 yrs. exp. in systems, networks or operations mgmt. experience req.
- **Disaster Recovery Coordinator (Job Code: ITC-3934)** 3 yrs. exp. in disaster recovery planning/ coordination.
- **Re-Engineering Analyst (Job Code: ITC-2892)** 5 yrs. progressive exp. in TQM, Business Process Redesign, IT.
- **Sr. Business Analyst (Job Code: ITC-2894)** 3 yrs. exp. with imaging system implementations/ workflow processes.
- **Sr. Clinical Analyst (Job Code: ITC-4726)** 3 yrs. exp. in clinically related specialty, 2 yrs. in information systems.
- **Clinical Analyst (Job Code: ITC-4731)** 3 yrs. exp. in clinical related specialty.
- **Database Programmer (Job Code: ITC-2583)** Oracle, PL/SQL, Unix
- **Software and Web Engineer (Job Code: ITC-2582)** Perl, Java, JavaScript, Unix
- **Software and Systems Analyst (Job Code: ITC-2144)** BSCS, C, C++, Java

***St. Jude is located in Memphis, Tennessee,** a city rich in history and culture stretching from the banks of the mighty Mississippi to the rolling green hills of eastern Shelby county. Memphis has something to offer everyone whether it's the dazzling night life along legendary Beale Street, the cultured theaters and museums, breathtaking nature preserves, or walks through historic, picturesque Midtown. Memphis also hosts over 150 festivals and special events each year in addition to many major sporting events. So whatever your interest, Memphis can offer you a world of possibilities!*

St. Jude offers professional growth opportunities, competitive salaries and a comprehensive benefits package. A full description of these positions can be seen on our web site. For immediate consideration, please e-mail or send hard copy (INCLUDING JOB CODE) to: **St. Jude Children's Research Hospital, HR Dept., 332 N. Lauderdale, Memphis, TN 38105. Fax: 901-495-3123. E-mail: lisa.martin@stjude.org**

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www.stjude.org

An equal opportunity employer, SJCRH screens candidates for a drug-free work environment.

Manhattan Associates, Inc., a worldwide leader in supply chain synchronization systems is looking for analysts and developers to join our team at our Atlanta area headquarters. $50K and up. Current openings include:

PKMS Implementation Specialists. Use knowledge of management practices to coordinate client projects & interact with all levels of client org. to implement & optimize PkMS supply chain software on mult. platforms. Advise & design sys test plans. Facilitate development of proposals & supports for sales presentations. Req. MS in comp. sci, engg, or related tech. field or management field.

PKMS Implementation Consultants. Coordinate client projects & interact with client org. Evaluate client bus. operations & sys environments to implement client proprietary software sys. Advise & design sys test plans. Assist in development of test & production environ. at client sites. Assist in develop. of proposals & supports for sales presentations. BS in comp. sci, engg, or related tech. field. Substantial travel req.

Software Developers. Assist in defining sys scope & requirements, analyze use of existing sys requirements, & design & develop sys in light of future directions in hardware & software growth. Develop & direct design of software sys. MS in comp. sci, engg, or related tech. field. Technical knowledge of: RPG/400, or C++ & CORBA on a Unix or NT platform with an Oracle database utilizing class design & class implementation, or MicroFocus Cobol on a Unix platform with an Oracle database demonstrated through edu. or exp.

Software Analysts. Design, develop, code, test & debug software applications. Req. BS in comp. sci, engg, or related tech. field. Exp. to include 6mths using RPG/400 or C++.

Database Administrator. Database implementation and support to users on database applications across platforms utilizing knowledge of Unix and Shell programming as well as SOL, PL/SOL. Req. MS in comp. sci, engg, or related tech. field

Senior Software Engineers. Develop & direct software programming, documentation & sys testing procedures for software program applications. Req. MS in technical field (comp. sci, IT, math, engineering, physics, etc) & 3 yrs exp as a developer or tech leader or a BS in a technical field & 5 yrs exp as a developer or tech leader. Exp. to include at least 6 mths with full life cycle development using C++ or RPG/400.

Resumes to: J. Lurey, Manhattan Associates, 2300 Windy Ridge Pkwy, 7th Fl. North, Atlanta, Georgia 30339

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Software Engineer. Conduct independent research and development in the area of telecommunication network management and service provisioning process, including protocol design and system implementation. Responsibilities include refinement of the definition of the application domain, collection and evaluation of domain knowledge, implementation and testing of the network object model and system programming, maintenance and support of the running system in operation. Act as a key member of the Distributed Object Management and Activation for Integrated Networks (DOMAIN) project. This extremely complex system requires management of distributed information and large scale software implementation involving databases, object oriented design/analysis/programming, CORBA, Internet and World Wide Web (WWW) technologies. Responsibilities include 1) designing and implementing a framework for distributed application development 2) formulating and implementing an intelligent engine for telephone number retrieval and allocation during service provisioning 3) conforming existing application code to ANSI C++ standards. Requires MS in CS plus 1 year experience in Object Oriented Programming and Distributed Computing in a university, national or private sector laboratory. Experience must include 1) research and hands-on experience in object oriented and distributing computing technologies to be able to develop such a large scale system 2) knowledge of C++, Java, Generic software libraries (Standard Template Library) and CORBA 3) thorough understanding of internet technology like WWW, CGI, and HTML. $75,000/yr, 40 hrs/wk, 8-4:30pm. Send 2 resumes to Case# 19983140, PO Box 8968, Boston MA 02114.

SOFTWARE ENGINEER: Data modeling using CASE tools like ERWIN, TURBOANALYST to do structured system analysis and design of complex relational databases, that is, to produce Entity Relationship Diagrams (ERD), Data Flow Diagrams (DFD) and Functional Decomposition diagrams. Using ORACLE development tools like ORACLE*FORMS 4.5, ORACLE REPORTS 2.5, Developer/2000, SOL*FORMS, SOL and SOL*PLUS, EMBEDDED SOL in PRO*COBOL and PL/SOL. Developing STORED PROCEDURES, FUNCTIONS AND DATABASE TRIGGERS using PL/SOL for server end processing. Job duties are Analysis of current procedures and problems to refine and convert the data to programmable form; determine output requirements; study existing systems to evaluate effectiveness; upgrade systems presently in use; develop, test and implement new software; observe functioning of newly implemented systems and programs for trouble areas; correct systems/programs as necessary. Requires Masters in Computers (or) Sciences with no experience required.. 40 hours per week at $ 72,000 per year. Please send resume to Case # 19990908, PO Box # 8968, Boston, MA 02114.

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Since 1996, HealthStar Network has proven itself a successful and progressive leader in quality, cost effective managed care. As part of this dedication to excellence, we are affiliated with several renowned hospitals in the New York area including Northern Westchester Hospital Center, White Plains Hospital Center, Lawrence Hospital, and Phelps Memorial Hospital Center. To help us attain the goals we've set for the new century, we're seeking to enhance our staff with the following professionals.

★ SYSTEMS ENGINEER

We seek a candidate with a strong technical background for technical design, implementation, administration and support for AS400 and NT environment. Must have 5-7 years of related experience, a strong background in NT Server 4.0, AS400 and Unix, and demonstrated strong interpersonal and customer focus skills. BS degree also required. Knowledge of Sybase, Citrix, AIX, system performance, system management and capacity planning will be a strong plus.

★ NETWORK ENGINEER

The qualified candidate will be responsible for technical network design, implementation and support for LAN/WAN environment. Must have 5-7 years of related experience, a strong background in routers, switches, cabling systems, TCP/IP and carrier services. BS degree and demonstrated strong interpersonal and customer focus skills required. Knowledge of Openview Citrix, tariff knowledge, network performance and capacity planning will be a strong plus.

★ SYSTEMS SUPPORT MANAGER/ ASSISTANT DIRECTOR

Individual must have a Bachelor's degree and 5 + years experience in hospital information on financial and billing systems, HBC or SMS - Project Management experience. We will train for this position.

★ SYSTEMS ANALYST (RN Background a plus)

Qualifications include in depth knowledge of hospital business or clinical application. Perfect opportunity for an RN willing to change careers into systems applications. We will train for this position.

HealthStar Network offers an exceptional compensation package that you would expect from an industry leader. For consideration, please send/e-mail your resume indicating position of interest and salary history to: **Michael Pagliaro, Senior Vice President/Human Resources, White Plains Hospital Center, Davis Avenue at East Post Road, White Plains, NY 10601; E-mail: mpagliaro@healthstar.org** Equal Opportunity Employer M/F.

HEALTHSTAR
NETWORK

Software Engineer: Duties: Design, develop, test, implement, enhancements and maintenance of different business applications running on IBM-AS400 platform using different software packages including LANSA, J.D EDWARDS and programming languages RPG, COBOL and CL. Evaluate & interface between hardware and software. Job to be performed at Miami, FL and various unanticipated client sites throughout the U.S. as assigned. Requirement: Masters degree in either Engg, or Math, or Sci. or Comp Sci. and one yr./exp. in the job offered or will accept a bachelor's Degree with 5 yrs. of progressive exp. in the relevant field in lieu of a Masters degree. Salary: $60,000./year. Hours: 8:00 AM to 5:00 PM, 40 Hrs/week. Submit copy of resume to, Order #FL-2060500 Bureau of Workforce Program Support, P.O. Box 10869, Tallahassee, FL 32302-0869.

Senior Programmer/Analyst (Burlington, MA) Perform system analysis, design, develop, implement and main complex engineering, business and management information applications and systems including networked and client server applications. Develop and maintain workflow and application security using Object Oriented methodologies, Case tools, Oracle, Oracle Forms, C++, Powerbuilder, Frameworks and Unix Shell programming. Interface directly with customers to resolve problems with IT infrastructure. Provide ongoing hardware, software and peripheral support to end-users at the work station and server levels. Reqd Masters in Comp Sci. 1 yr exp in job offd. 40hr/wk, 8a-5p, $65,000/yr. Submit 2 copies of resume to Case No. 19990056 PO Box 8968, Boston, MA 02114.

SOFTWARE ENGINEER: Using Oracle tool set Oracle Developer 2000, SQL*Forms, SOL*Report writer, SOL*Plus, PL/SQL and in developing procedures, functions and database triggers using PL/SOL for server-end processing. Using the SOL base 5.2, SQL Windows 5.0, Report Windows 2.1, SQL Talk 3.2. Developing applications using Data General's Dg/Mv 15000, Dg-Cobol, Dg/Rdbms, Embedded SOL, Aos/Vs, Power house present. Using the VAX Rdb, Decforms, Embedded SOL, VAX3400, VMS and Acms. Job duties are Analysis of current procedures and problems to refine and convert the data to programmable form; determine output requirements; study existing systems to evaluate effectiveness; upgrade systems presently in use; correct systems/programs as necessary. Requires Masters in Computers with no experience required. 40 hours per week at $ 75,000 per year. Please send resume to Case # 19990772, PO Box # 8968, Boston, MA 02114.

Software Engineer

Design, Development, Testing and Implementation of commercial/ business application systems. Must have demonstrated ability in design and development of application using Oracle 7.0/6.0, RDBMS/SQL and Oracle tools; demonstrated ability using Pro*C for designing Oracle access modules; and demonstrated ability working on Unix operating systems. Req 2 yrs exp in job offered or 2 yrs exp as a Software Developer. BS in Engg., Computer Sci., Math or related field. Salary is $55,000/yr, 40 hrs/wk, 8:00 to 5:00 p.m. Send two copies of resume to Job Order # 19990493, P. O. Box #8968, Boston, MA 02114.

SOFTWARE ENGINEER

Software Engineer to design, develop and test computer software for business and scientific applications, applying principles and techniques of computer science, engineering and mathematical analysis; analyze software requirements for feasibility of design and hardware interface; design and direct software system testing procedures; and use expertise in Baan ERP software, Baan Dynamic Enterprise Modeling tools for Product Data Management and Enterprise Resource Planning applications. Requirements: Masters Degree in computers, engineering, industrial management, business or related field and three years experience as a software engineer or computer programmer. Knowledge of Baan software and tools. Salary: $75,000/yr. Working Conditions: 8:00 a.m. to 5:00 p.m., 40 hours/week. Apply: Ms. Margaret Weckerly, Acting Manager, Butler County Job Center, 227 West Cunningham Street, Butler, PA 16003. Refer to Job Order Number WEB 87768.

DATABASE ADMINISTRATORs (3 positions) to provide systems and database admin on Sybase; perform physical database design, capacity planning, table space management, query optimization, schedule activities, monitor database storage space, administer security and tune database for optimal performance; develop applications with VB and PowerBuilder as front end on Windows NT and HP9000 machines; provide on-site training in Sybase and database admin. Require: M.S. in Comp Sci, Comp App. or Engg (any branch). Salary: $65,000 per year, full time. Resumes to: HR, Software Technical Services, 105 Nobel Court, Alpharetta, GA 30005.

Information Technology Management Consultants seek to fill a position of Sr. Manager. Qualified applicant should have a B.S. or equiv. in a Computer Sc. or Engineering discipline. Should have 3 yrs. relevant SAP & eBusiness exp. Will manage eBusiness & SAP solutions, Knowledge Productivity Management, development of Strategic System Plans, Enterprise Resource planning, lead the Global Maintenance & Service Industry group, participate in marketing activities, establish & implement company goals, policies & procedures. Manage, supervise & train SAP implementation teams, interview & evaluate qualifications of potential consultants. Send resume to Managing Director, Magnus Management Consultants USA, Inc., 3340 Peachtree Rd., NE, #2310, Atlanta, GA 30326

Manager Marine Systems Development. All duties of Manager Marine Systems Development. Position is located in Miami, FL. Responsible for company's safety and quality management program in accordance with International Safety Management (ISM), SVP, and ISO 9002 regulations. Responsible for the development, design and implementation of various quality assurance programs. Responsible for marine operations administration and daily management. Requirements: B.S., or foreign degree equivalent in Computer Science and Computer Engineering; 2 yrs exp. in the job offered or 2 yrs. exp. as Systems Manager Operations Controller; 40 hrs per week; 9:00am-6:00pm; $100,000.00 per year. Send resume to Dept. of Labor/Bureau of Workforce Program Support P.O. Box 10869, Tallahassee, FL 32302-0869. RE: JO#FL-2058484.

Computer Services Co in North Brunswick, NJ seeks to fill the following positions:

1) Database Administrators (multiple positions)-Must have Bach Degree in any field & 1 yr exp coordinating physical changes to databases on UNIX & NT platforms; coding, testing & implementing databases; dsgng logical & physical databases; establishing physical database parameters.

2) Software Engineer-Must have Masters in Comp Sci, Comp Engg or Elec Engg & 1 yr exp analyzing, dsgng & dvlpg relational database mgmt systems using ORACLE, C & PL/SOL in UNIX & Win envrmnt.

Respond to: HR Dept, Vertex Soft Inc., 63 Sassafras Court, North Brunswick, NJ 08902.

Software Engineers (Multiple Openings) sought by Software & IT Consulting Co. in New Brunswick, NJ. Must have Bachelors w/any Technical/ Business related major and 2 yrs exp dsgng applics using any of the following:

i) VB, SOL Server
ii) Java/HTML, Oracle
iii) Unix/NT Systems Administrator
iv) Oracle, PL/SOL
v) C++/Unix/Oracle
vi) Web Developer/ASP/Perl
vii) SOL Server DBA
viii) Oracle DBA
ix) PowerBuilder/SOL/Oracle
x) Informix 4GL

Respond to: HR Dept, Universal Software Solutions, Inc., 92 Bayard St, New Brunswick, NJ 08901.

Programmer Analysts (5 positions) To analyze, design & develop application software using Informix and Oracle databases, Informix On-line 7.3, Informix-4GL, Informix ESOL-C, Informix-SOL, C and shell scripts on UNIX OS; develop and deploy applications on MS Windows using VB and Client/Server technology.

Programmer Analysts (3 positions) To analyze, design and develop applications using VB, MS SOL Server, Oracle, MS Access, HTML, GCI Programming, Visual Source Safe 6.0 and Visual Database tools under Windows 95, DOS and UNIX OS; document and develop logic, coding and provide customer support.

Require BS or equiv. with conc. in Comp/Sci, Math or Engg (any branch) and 2 yrs exp. in IT field. Salary $60,000 per year full time. Resumes to Ordusion Technologies, 6055 Atlantic Blvd, Ste K2, Norcross, GA 30071.

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Programmer Analyst, Boston, MA; Develop and maintain an interactive web site using Microsoft Internet Information Server 4.0 running on Microsoft Windows NT Server network operating system version 4.0 to access fares, make reservations and purchase of travel by an individual surfer. Establish WWW service for the company. Design, develop and implement a LAN and WAN. Provide technical support. Maintain database on SABRE for update fares information accessible to travel companies nationwide. Req'd. Bachelors. in Comp. Sci.or Engg. or Math. 1 year exp in job offered. 40 hrs/wk, 9.00am-6:00pm, Mon-Fri. $21.25/hour. Applicants should submit two (2) copies of resume in response to: Case#19981582, PO Box 8968, Boston, MA 02114.

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Programmer/Analyst (Burlington MA) Design and develop front end and database applications using Oracle, MS-Access, Crystal Reports and Visual Basic for the retail and automobile industry, most transactions involving the procurement and manufacturing cycles. Develop customized EDI transactions using Unedifact and ANSII standards. Prepare test scripts, test data and perform systems integration and prepare user documentation. Implement and support the application in production. Reqd Bachelors or equiv in Comp Sci. or Eng 2 yr exp in job offd. 40 hr/wk, 8-5p, $60,000/yr. Submit 2 copies of resume to Case No. 19990057 PO Box 8968, Boston, MA 02114.

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Systems Administrator, Malden, MA; Install, configure, maintain and troubleshoot Unix operating systems, Netware, NFS, NIS, DNS & RAID systems. Install, configure & maintain LSF and SAS software. Program in Assembly, Perl & Bourne shell. Upgrade system Hardware. Provide technical support. Req'd. Masters* in Engg. or Comp. Scie. or Math. 1* yr exp in job offered. *Will accept Bachelors degree & 5 yrs experience in lieu of Masters & 1 yr exp. 40 hrs/wk., 9a-6p., Mon-Fri., $89,668/Per Year. Applicants should submit two (2) copies of resume in response to Case #19990364, P.0. Box 8968, Boston, MA 02114.

SOFTWARE ENGINEER: Knowledge in Functional Hierarchy Diagrams, Object Modeling Technique Conventions and notations. Using Java, JDK (Java Development Kit), Visual Café and JBuilder. Knowledge in using HTML, Java Script, CGI and PERL. Job duties are Analysis of current procedures and problems to refine and convert the data to programmable form; determine output requirements; study existing systems to evaluate effectiveness; upgrade systems presently in use; develop, test and implement new software; correct systems/programs as necessary. Requires Masters in Computer Science with no experience required. 40 hours per week at $ 73,000 per year. Please send resume to Case # 19990373, PO Box # 8968, Boston, MA 02114.

Consulting firm seeks Computer Profesionals, Progg. Analyst w/B/S 2 yrs. and/or Software Engg. w/ M/S & 1 yr exp. with foll. skills sets. Will accept a combination of Edu. & Exp in lieu of a BS or MS degree.

- Cobol/400, AS/400, RPG/400
- SOL/400, DB2/400
- Visual Basic, C++, Unix Prog
- Java, Java Servelets, Java Swing , JDBC
- VB 5.0/6.0, ASP, COM/DCOM, Visual InterDev
- ActiveX Control Progg. & Object Oriented Prog.

Travel & reloc. Req. Excel. Salary & Benefit Package

Apply w/resume to: Softek Information Services, Attn: Recruiter 762 Green Street #2F Iselin, NJ 08830.

Edgesys, Inc reqs Computer Professionals. Positions available req MS (or equiv) & 1 yr exp for Software Engr & BS (or equiv) & 2 yrs exp for Programmer Analyst.

- AS/400, RPG/400, COBOL/400
- CL/400, SOL/400, OUERY 400
- Visual Basic, SOL Server, Access, Oracle, ASP
- FoxPro, Developer 2000, Unix
- Java, HTML, DHTML, CORBA
- Frontpage, Visual InterDev

Excellent Benefits Apply to: Attn: Recruiter, 352 7th Ave, Ste 1215, NY, NY 10001.

Software Developer, N. Bethesda, MD. Provide scientific & technical leadership to programmers & scientists to design, develop & implement pharmacogenomic cgi/client/server software applications using algorithms for DNA, protein gene expression analysis, neural network Markov model & clustering. Work with C/C++, Perl, HTML & Oracle or Sybase databases & SOL for OS Windows NT& Unix. Required M. S. C. S. w/post-grad work in molecular biology & genetics & 2 yrs rel. exp. M-F, 40hrs/wk. Send resume to K Durazo, HR, Ref. 301, InforMax, Inc., 6010 Executive Blvd., 10th Floor, N. Bethesda, MD 20852.

Programmer Analyst, Stoneham, MA: Analyze, design, develop & implement RDBMS applications using Oracle, MS-SQL Server and Sybase. Perform Oracle Database Administration and performance tuning. Develop real-time applications using Client/Server technology, Developer 2000, Power Builder and Visual Basic. Req'd. Bachelors in Comp. Sci. or Engg. or Math. 2yrs. exp in job offered. 40 hrs/wk. 9a-6p. Mon-Fri. $26.39/hr. Applicants should submit 2 copies of resumes response to Case # 19990133, P.O. Box #8968, Boston, MA 02114.

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Programmer Analyst, Sr.

wanted by Info Technology Firm in Edison, NJ. Must have Masters in Comp Sci or MIS & 1 yr s/ware exp.

Respond to: HR Dept, Strategic Professional Services, Inc., 505 Thornall St, Ste 304, Edison, NJ 08837.

◆

Academic Computing Specialist wanted to install, maintain, & support computing systems required for faculty research & teaching applications. Must have Bach. Deg. in Computing or business related field & 1yr. exper. in an acad. computing setting. $18.50/hr. for 40/hr. wk.
Send resume to Dept. of D., HR, Suffolk Univ., 8 Ashburton Pl., Boston, MA 02108. An equal opportunity employer.

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Programmer/Analyst: Configure, maintain and analyze e-commerce web site. Manage web site content and system modeling. Design and develop front-end web interface. Implement back-end database design and storage. Req. MS or equivalent in CS or CIS; Proficiency in ASP, SQL and networking protocol TCP/IP. $65,000.00/yr., 40hr/wk, 8:00 a.m.-5:00 p.m. Contact Human Resources, Place Collegiate Properties, LP, 101 Marietta St., NW, Suite 1050, Atlanta, GA 30303. email: job@placeproperties.com (no phone calls please)

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Web Designer wanted by Computer Networking Co in New York, NY to dsgn, create & dvlp internet pages in Japanese. Must have Bach in Fine Art, Graphic Design or related field.

Respond to: HR Dept, Unitrendix, 747 Third Ave, 36th Fl, New York, NY 10017.

Data Base Administrator

wanted by New Jersey based S/ware Dvlpt Firm for job loc throughout the US. Must have Masters in Comp Sci, Math or Engg (any field) & 2 yrs s/ware exp.

Respond to: HR Dept, Laxmi Consulting Services Inc., 200 Essex Turnpike, Ste 201, Iselin, NJ 08830.

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Principal Software Engineer sought by Co providing E-Solutions - Integrated Web Systems in Concord, MA. Must have BS in Math or Comp Sci & 5 yrs exp in s/ware engg including C++ experience.

Respond to: HR Dept, Kanda Software, Inc., 358 Baker Ave, Concord, MA 01742.

Engineer, Software Quality wanted by S/ware/News Aggregation Firm in Burlington, MA. Must have Bach in Comp Sci or related field.

Respond to: HR Dept, NewsEdge Corporation, 80 Blanchard Rd, Burlington, MA 01803.

Database Administrator
wanted by financial services firm in New York, NY. Must have BS in Electronics & Communications Engg or Comp Sci or Math & 2 yrs exp providing production support for several Oracle databases in a dynamic HP-UNIX and NT envrmt. Backup & recovery, performance tuning, RMAN, OEM, space mgmt, strong SQL, logical/physical database design.
Respond to: MIS-Director of Systems, Nathan & Lewis Securities, Inc., 260 Madison Ave, New York, NY 10016.

Programmer Analyst/Internet Software Developer wanted by Internet Network Firm in Purchase, NY. Must have Bachelor in Computer Science/ Electrical Engineering plus 2 years experience planning, developing, testing and documenting Internet and network related programs. Database development experience w/INFORMIX in UNIX environment and shell scripts, C, C++ and SQL languages required. Send resume only to UUNET Technologies Inc. c/o C.Growhowski, 100 Manhattanville Rd., Purchase, NY, 10577.

Systems Administrator

wanted by S/ware Dvlpt Firm in New York, NY. Must have MS in Inform Systems, Comp Sci, Electr Eng'g or Math & 1 yr exp supporting & maintaining internal network system & network infrastructure.

Respond to: HR Dept, Imagine Software, Inc., 400 Madison Ave, 21st Fl, New York, NY 10017.

SR. SOFTWARE CONSULTANT System integration of multiple customer platforms to support company's EDI/E-Commerce products. Bachelor's Computer Science + 5 years exp IT consulting. Proficiency w/ NT, UNIX, AS/400, Novell, Oracle, Microsoft SQL Server, Ingress, DB/2, LAN/WAN, Communication, Microsoft Backoffice Products (IIS, Proxy Server, Exchange Server) EDI, E-Commerce, SAP (ERP Package). $80,000/yr. 8:30am-5:30pm, M-F. Send resume to: Lisa Phillips, Recruitment Mgr, Harbinger Corp, 1277 Lenox Park Blvd, Atlanta, GA 30319, REF#KKT

Software Engineer wanted by Comp Services Co in Holmdel, NJ. Must have Masters in Comp Sci, Comp Engg or Info Systems & 6 mos exp analyzing, dsgng & dvlpg comp s/ware using Visual Basic, Visual C++, Crystal Reports, SQL, SQL Server anywhere, MS Access & other relational database tools.
Respond to: HR Dept, Integrated Solutions, Inc., 2124 Highway 35, Holmdel, NJ 07733

Programmer/Analyst: using Visual C/C++, Direct Draw, COM\DCOM on Windows platform to design, implement & maintain 2D/3D graphical firearms training software system. Req. MS or equivalent in CS or MIS; Proficiency in Visual C++, COM\DCOM and Windows NT/98. $62,400.00/yr., 40hr/wk, 8:00 a.m.-5:00 p.m. Contact Mike Kim at Technical Resource Group, Inc., 1040 Crown Pointe Pkwy., Ste 500, Atlanta, GA 30338 mkim@dreamjob.com.

Software Engineer

wanted by New York based Comp S/ware Dvlpt Firm for job loc in New York Metropolitan area. Must have Bach in Comp Sci, Engg or Math & 2 yrs exp researching, dsgng, dvlpg, testing & implementing comp systems s/ware using C++.

Respond to: HR Dept, L & A Inc., 264 Forest Ave, Rye NY 10580.

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Network Administrator Systems Analyst wanted by Mftr of Fuel/Pump Dispensers in Greensboro, NC. Must have Bach in Comp Sci or equivalent or BS thru edu/experience & 2 yrs network exp, two yrs exp in multidomain NT environment and MCSE certification required.

Respond to: HR Dept, Marconi Corporation, 7300 West Friendly Ave, Greensboro, NC 27420-2087.

Programmer-Web Designer

wanted by Branding & Communications Co in New York, NY. Must have 2 yrs exp converting data from project specifications to create websites & online annual reports using HTML, DHTML, Java Script, Perl, ASP, SSI & SQL, Comp Languages.
Mail resume to: HR Dept, Addison Design Co, 79 5th Ave, New York, NY 10003.

Sipex Corporation, headquartered in Billerica, Massachusetts, seeks a Systems Administrator to direct project teams in the deployment of PROMIS software. Duties include performing system upgrades and new revisions. Requires a Bachelor's degree or equivalent in an engineering or technological discipline and industry experience. If interested and qualified, forward resume to: Human Resources, Sipex Corporation, 22 Linnell Circle, Billerica, MA 01821.

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wanted by Software Dvlpt Co in Boston, MA. Must have Bach in Engg, Comp Sci or related field & 5 yrs s/ware exp.

Respond to: HR Dept, Redwood Investment Systems, Inc., 76 Summer St, Boston, MA 02110-1225.

Software Consultant (Concord, CA) Interface EC products w/ clients' applications, create/deliver EDI presentations/product demos, work w/ multi-business partners to design/build/support EC solutions. BSc Computer Sci or Eng, 5 yrs exp Project Mgr, Softw Eng or Softw Consult, knowldg of Unix, NT, Sybase, Oracle, Informix, EDI, C++, Perl, ShellScript, CGI, Java & exp w/ TLE & EDI, open/templar apps, BAAN, Oracle, Peoplesoft & SAP. $73,923.20/yr, 40 hrs/wk, OT as needed. Send resume to: S. Stevenson, 750 Commerce Dr, #100, Decatur, GA 30030.

Software Engineers (2 positions) manage teams to analyze, design, develop, test and implement applications using VB, Power Builder, CYRSTAL Reports, Oracle, SQL Server and Informix on UNIX and Windows; lead projects to develop interactive web sites using Java, VB Script, Java Script, HTML and ASP. Require: MS with Conc in CS or Engg (any branch) with 3 yrs exp. in the IT field. A BS or equiv. in any of the above with 5 yrs of progressive relevant exp will also be accepted. Salary $66K/yr, full time. 60% travel. Resumes to: Smartsoft International, Inc., 5815 Live Oak Pkwy, Suite 2H, Norcross, GA 30093.

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Vice President of Finance & Administration (Accountant) wanted by Internet Media Co in New York, NY. Must have Bach of Commerce in Accounting & 6 yrs accounting exp.

Respond to: HR Dept, c/o Ammar Afif, Yack, 461 Fifth Ave, 12th Fl, NY, NY 10017.

COMPUTER ANALYST wanted by Info Tech Firm in Union, NJ. Must have BS in any field & 2 yrs exp in mainframe envrmt dvlpg Cobol, Focus & Web Focus prgms.

Respond to: HR Dept, Patel Consultants Corporation, 1525 Morris Ave, Union, NJ 07083.

Programmer Analyst wanted by Co involved in mfg & distribution of chemicals, plastics in Trenton, NJ. Must have Bach in Comp Sci or Comp Engg & 2 yrs exp analyzing & evaluating existing or proposed systems, devise comp programs, systems & related procedures to process data using Developer 2000, Oracle 7.x, PL/SQL, C & C++.

Respond to: Sam Pittam, Hutchinson Industries, Inc., 460 Southard St, Trenton, NJ 08638. Fax 609-394-2031, email: spittam@hutchinsoninc.com

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SR. PROGRAMMER ANALYST

With the ability to lead and formulate logical statements of business problems, you will devise procedures and solutions through the use of data processing and programming systems. Will also work as a technical contributor on project support and development including analysis design, development, testing, implementation and client support. Requires a Bachelor's degree in IS, Computer Science or equivalent and 3-6 years' related experience. Technical excellence, good communication skills and the ability to work well with others are essential. Proficiency in Microfocus Cobol, Visual Basic, Sybase or Oracle and SQL and previous work experience in a UNIX and Windows 95 or NT environment necessary.

LEAD PROGRAMMER ANALYST

Will assist as technical contributor on project development phases, provide client support on PC-based or mainframe system and prepare recommendations for major systems installations and changes. Must be a project-oriented team player with 4 years' Visual Basic experience in a Windows 95 or NT environment and a thorough understanding of PC office software. A Bachelor's degree in Computer Science, Business Administration or equivalent with working knowledge of IMS/COBOL, SQL and/or Sybase/Oracle database preferred.

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Responsible for the design of databases to provide efficiency, reduce data storage requirements, minimize storage costs and provide optimum data access or system performance. Will also be involved with programming in SQL, C-SHELL and KORN SHELL and data modeling with a case tool in a UNIX environment. Requires 4+ years' experience in Database Design and Administration using Oracle or Sybase with the ability to communicate effectively with all levels of technical and non-technical personnel.

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For consideration, please send resume and salary history indicating Job#00M2288 to Don Boswell, The Johns Hopkins University, School of Medicine, P.O.Box 2454, Baltimore, MD 21203-2454, or email dboswell@jhmi.edu EOE/AA/D/V.

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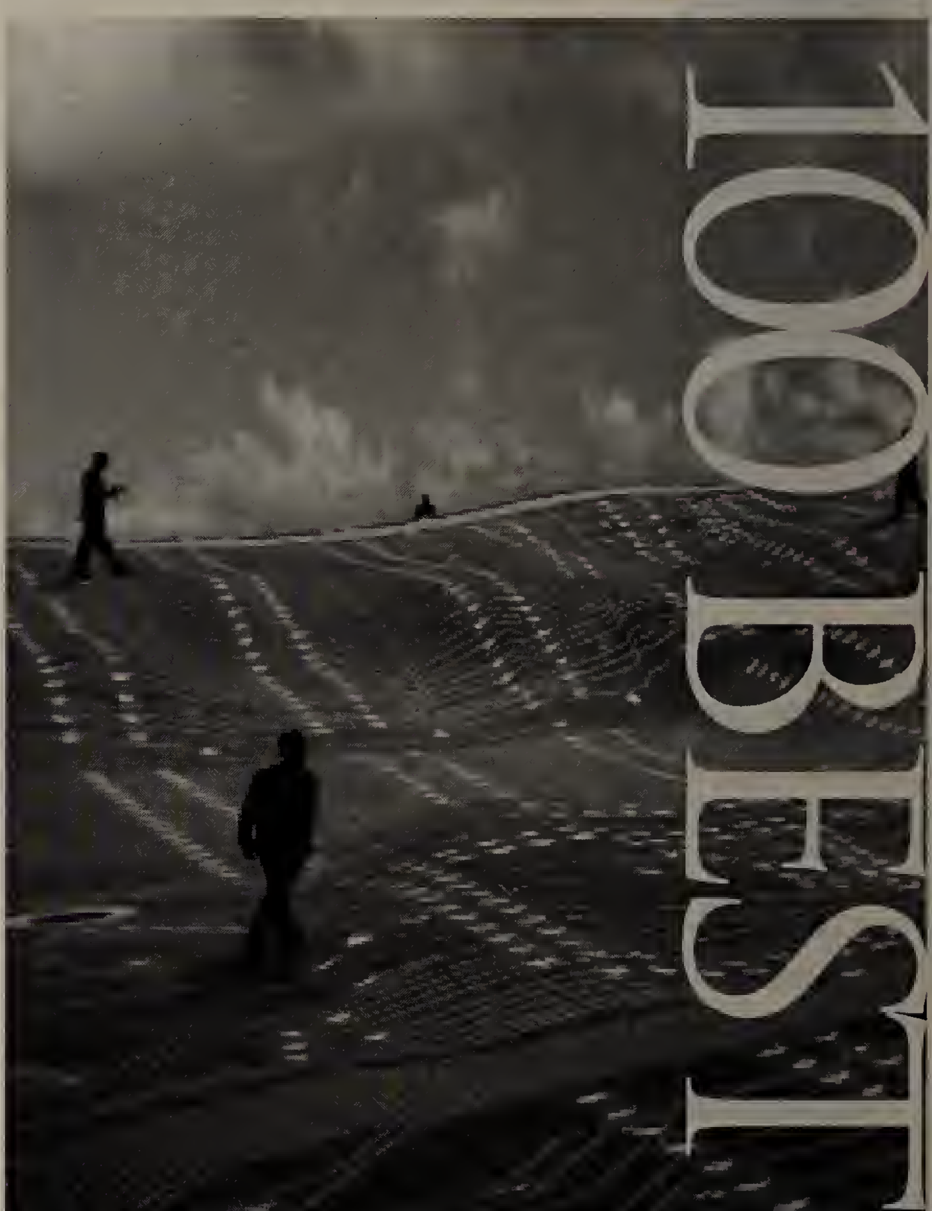

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IT Careers in Healthcare

by Carole Hedden

It's called the e-healthcare space – the combination of healthcare and patient wellness with e-commerce. There are plenty of opportunities for applying technology to the industry while also participating in medical discovery, research and development and innovation.

GE Medical Systems

Waukesha, WI

Early in the 20th century, X-rays came into being, serving as the foundation for the GE Medical Systems business. Today the $7 billion developer, manufacturer and distributor of medical imaging technology, patient monitoring systems and information systems to the healthcare industry is more and more often focusing on information technology.

Greg Lucier, vice president and general manager of global services, says the business has three primary areas of IT focus. "We're doing very advanced remote monitoring and diagnostics of imaging equipment," he says. "For example, a customer in Atlanta may have an MRI – we monitor the device to assure its upkeep and to provide upgrades. We also offer training and other services for the users of that piece of equipment – and it's delivered to the customer through information technology."

GE Medical Systems also is helping hospital staffs manage imaging data throughout the facility. "Our customers more and more want to examine the image on a computer screen versus looking at film," explains Lucier. "We also are providing general information technology surrounding patient information and data mining so that our customers can identify better treatment paths."

To meet these customer needs, GE Medical Systems needs people who understand the healthcare industry. Matthew Fairbairn, human resources manager, explains, "We need people who can devise solutions that allow people delivering healthcare to be far more effective. Engineers, software developers, system integrators and people with web-based experience are needed. During our interviews, we look for people who have a tremendous amount of energy and who can energize others."

> *"There's a high degree of certainty that what you do will make a difference and that you'll be given the resources, reach and capability to make great ideas happen."*
>
> *Matthew Fairbairn*
> *Human Resources Manager*
> *GE Medical Systems*

Lucier believes there are advantages for working in the e-health space and at GE. "There's a high degree of certainty that what you do will make a difference and that you'll be given the resources, reach and capability to make great ideas happen," he says. Fairbairn adds that GE couples this prospect with offering a broad array of industries and businesses, providing a diversity of career pursuits. "You may come into GE through GE Medical Systems, but depending on what you want to achieve, you can move to any number of businesses, from power to consumer products – all within the same company. GE offers a very dynamic and exciting environment with tremendous growth opportunities for employees throughout the company."

WellPoint Health Networks, Inc.

Thousand Oaks, CA

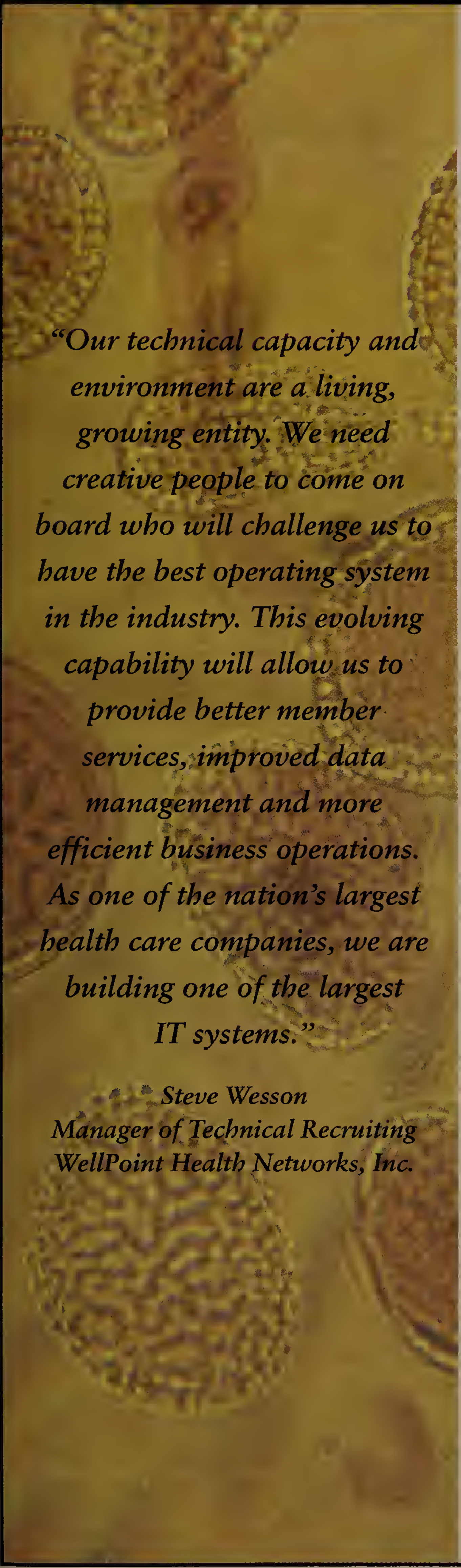
The healthcare, financial and management areas offer another angle on career opportunities. WellPoint Health Networks, the parent company of Blue Cross of California, is one of the largest healthcare companies in the nation. For the second year in a row, *Forbes Magazine* has named WellPoint as "The Nation's Most Admired Healthcare Company."

Today, the WellPoint group of companies includes UniCare Health Plans, a pharmacy benefit management program and several specialty divisions, including life insurance, behavioral health and dental programs. "The mission hasn't changed, but we've expanded geographically, and we offer more product choices to employer groups and individuals," says Steve Wesson, manager of technical recruiting.

"We view e-business as a key opportunity for our company," he adds. "We want to position ourselves to take full advantage of that opportunity." In addition to the traditional business units, the company recently added an e-business division to focus resources and nvestments on this evolving industry.

Initially, the new role of IT focuses on defining a strategic enterprise architecture. Wesson says this

IT Careers in Healthcare



> *"Our technical capacity and environment are a living, growing entity. We need creative people to come on board who will challenge us to have the best operating system in the industry. This evolving capability will allow us to provide better member services, improved data management and more efficient business operations. As one of the nation's largest health care companies, we are building one of the largest IT systems."*
>
> *Steve Wesson*
> *Manager of Technical Recruiting*
> *WellPoint Health Networks, Inc.*

will involve a number of changes in platforms, technologies, and integration opportunities across the business.

Web sites and technologies are being refined to work from a branding and identity perspective while offering new features and services to consumers and businesses using the health plans.

"Our technical capacity and environment are a living, growing entity," he adds. "We need creative people to come on board who will challenge us to have the best operating system in the industry. This evolving capability will allow us to provide better member services, improved data management and more efficient business operations. As one of the nation's largest health care companies, we are building one of the largest IT systems."

WellPoint is looking for people well-versed in e-business development and client/server technologies such as Oracle and DB2, IBM's WebSphere and VisualAge, Java and other technologies. "When searching for IT talent, we first look to see that the candidates' technical skills are aligned with our environment, but secondly and equally as important, we look for candidates with growth, accomplishments and evidence of the ability to work in a team atmosphere," Wesson says.

In return, WellPoint offers associates a dynamic opportunity where the potential for growth and advancement is significant. "We're a very aggressive company, growing about 15 percent per year," according to Wesson. "We rely heavily on information systems and constantly challenge our IT people to come up with new ways and new technologies to support our business." WellPoint IT has also started to place increasing emphasis on training their internal staff for the target environment.

"WellPoint has the type of environment that allows you to interact with the latest technology, where you're compensated well and where you can continue to learn and grow," adds Wesson. "Healthcare is a growth industry. We will be providing products and services to more people than ever before. New medical treatment, advanced equipment and new drug developments will drive the growth of our industry. We must wrestle with the challenges these advances represent, and we must use technology effectively to manage growth.

White Plains Hospital Center/ HealthStar Network

White Plains, NY

In an industry where the mission remains to care for people, information technology is seen as the instigator of change, providing new tools to improve and manage patient care. The HealthStar Network represents an enabling IT force for four New York hospitals.

"We're an affiliation of four hospitals located in this geographic area," explains Michael Pagliaro, senior vice president. Other members of the hospital network include Phelps Hospital in Tarrytown, Northern Westchester Medical Center and Lawrence Hospital in Bronxville.

"We recently opened an IT Center that links the four hospitals," says Pagliaro. The new mission is to develop and implement projects that support the health system network. The new system IT provider is forging the four separate IT approaches into a single one, while concurrently developing tools for the hospital communities. In addition, the newly organized HealthStar IT Department will refine and improve web sites for the group and individual hospitals, as well as for the network's Phobia Clinic. Another project to be undertaken is to develop and implement systems serving the network's laboratories.

"We are hiring network people, technical engineers, those with data base expertise, operators, analysts, program developers, integration experts and help-desk personnel," says Pagliaro. "We need people who preferably have a medical background with technical capability."

In addition to the challenges of projects that span the business for a hospital, HealthStar offers ongoing training and education. "We want people to have the opportunity to stretch and grow. Here at HealthStar you'll be in on the ground floor of something all new," adds Pagliaro. "You'll be in a very competitive geographic area where there is tremendous importance given to information technology – yet here you'll have the ability and freedom to work your ideas."

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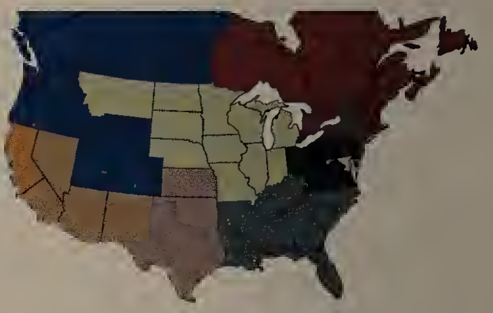

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DSL,

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to 14 voice channels plus hundreds of kilobits of data on a copper phone line connected to real-world phone networks. They were successful with equipment from several firms, not relying on just one vendor's scheme.

The demonstrations took vendors beyond their past practices of simply announcing DSL boxes that wouldn't interoperate with equipment made by others and put voice-over-DSL services on a reality track.

Customers soon will be able to buy voice and data services from a single carrier, have them delivered via one circuit and pay up to 40% less, some service providers say. Voice-over-DSL vendor MCG Communications in Phoenix offers a bundle of 10 voice lines, 'Net access and 500 minutes of long-distance for about $500 per month, roughly the recurring cost of a T-1 line.

While sales of such services today are negligible, they are set to skyrocket in the next few years, analysts say (see graphic).

To prove the technology is ready, service providers Focal Communications and Northpoint Communications teamed with equipment maker CopperCom to run multiple voice channels on their nets. Covad Communications held a demonstration with service provider GST Communications and hardware vendor Jetstream. Covad is also delivering voice-over-DSL services in field trials, with full rollouts expected in the second half of the year.

Rhythms Netconnections, a major nationwide DSL service provider, didn't demonstrate voice over DSL at the show, but plans to offer the service by year-end, says Catherine Hapka, Rhythms chairman and CEO.

Some vendors are so sure voice over DSL is about to take off that they are going beyond building the carrier network DSL boxes and are making customer site equipment as well to jump-start use of their technology.

Copper Mountain, which is focused on making DSL concentrators that funnel customer DSL lines into service providers' nets, introduced the CopperRocket 408 symmetric DSL integrated access device. The box enables voice over DSL by turning voice into IP packets and cramming them in among the IP data stream. At the same time, the box ensures that voice packets get top priority so the quality of the voice service is as good as that on the public phone network.

TollBridge makes a customer premise switch that converts IP voice to traditional circuit-switched voice and passes it along to the phone networks.

Most DSL providers rely on ATM, not IP, to carry voice and data traffic across DSL links because ATM is the most reliable technology today for imposing quality of service on different traffic types.

Alcatel, which sells much of the U.S. carrier DSL gear in use today, is selling CopperCom voice-over-DSL gear until it produces voice-over-DSL boxes of its own.

While voice over DSL was the sexiest application at the show, vendors are already looking for others. For example, Jetstream plans to announce at SuperComm that its CPX-1000 voice gateway will enable new types of phone services for packet-based carriers to offer.

Jetstream will do that in two ways. First, the company will add software to its device to create the new services, such as forwarding calls to a different number after four rings, then dropping calls into voice mail if no one answers at the second number.

The firm will then add software that makes it easier to access calling features that already exist on Class 5 local voice switches. Most of the applications that Class 5 switches support are not sold to customers because it is too difficult to provision them, says Stephen Gleave, Jetstream's vice president of marketing. The goal is to make it possible for customers to build their own caller profiles via a Web browser. They will be able to add and drop features without waiting for the service provider to do it.

In other events, Texas Instruments showed for the first time a voice-over-DSL prototype network to be used by service providers and equipment makers that want to write specifications for or build their own voice-over-DSL gear.

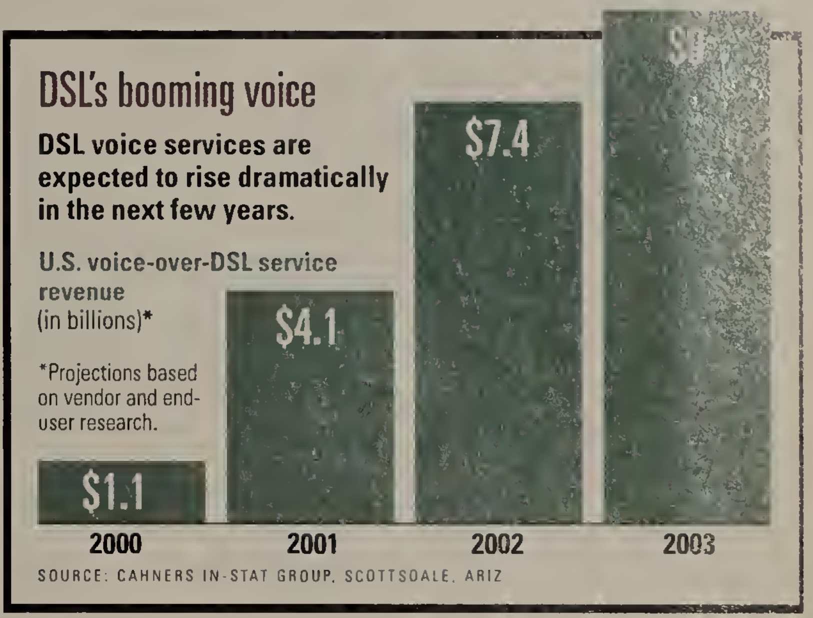
Nevertheless, for all the optimism at the show, the technology still faces shortages of components, particularly chips, that could slow deployment if demand spikes before component vendors increase production.

"We've hit a little of a supply shortage, but availability is already at a sufficient level to ensure growth," says Bill Rodey, vice president of sales and marketing for DSL vendor Westell and treasurer of the DSL Forum.

The problem is being resolved as chip makers prove their chips are interoperable. That means makers of complete DSL modems and multiplexers don't have to rely on one chip vendor for the silicon they need to build their products. Multiple sources should also drive down prices, Rodey says. ◪

DS what?

Only 11% of business and residential consumers even know what DSL is.
— DSL Forum



DSL's booming voice

DSL voice services are expected to rise dramatically in the next few years.

U.S. voice-over-DSL service revenue (in billions)*

*Projections based on vendor and end-user research.

SOURCE: CAHNERS IN-STAT GROUP, SCOTTSOALE, ARIZ

Stocks,

continued from page 10

we've seen such an extreme rise in the valuations of companies such as Cisco, Ciena, Juniper Networks and JDS Uniphase," says Cory Johnson, editor at large for TheStreet.com. "But these stocks have gotten almost too popular, and their valuations have become extreme . . . Everyone on Wall Street recognized that there had to be some belt tightening."

Nonetheless, Johnson says network firms are well-positioned for the long-term. "Investors are coming back to companies such as Cisco, Nortel Networks and Tellabs," he says. "And venture capitalists are going to continue to invest in network companies because they are a much safer bet than" business-to-business or business-to-consumer Web sites, Johnson says.

Among venture capitalists, interest in broadband providers, optical equipment and component manufacturers remains strong.

"There are still lots of places to make investments in networking," says William Seifert, general partner of Prism Venture Partners. "Products that improve the raw speed, performance or reliability of networks are in demand. . . . If the demand for the product is there, that will drive the entrepreneurs."

Seifert predicts the number of IPOs will decline as investors become more rigorous about testing out the business models of new ventures.

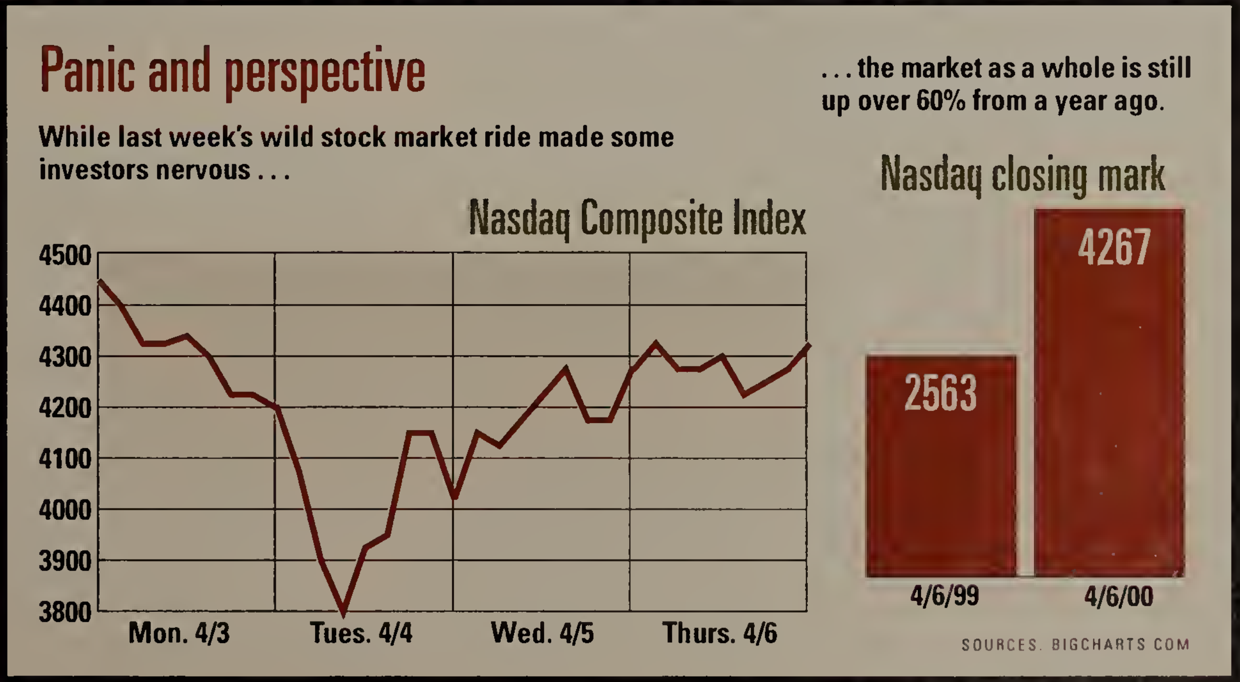
The question plaguing venture capitalists is whether the days of highflying, high-tech IPOs are over.

"A lot of the public offerings coming out recently have not performed," says Jack Biddle, principal of Novak Biddle Venture Partners. "If people stop buying IPOs, then venture returns will drop. If venture returns drop, then institutions will reduce their commitment to venture funds."

Biddle says many attendees at last week's Venture Capital Association annual meeting think the recent market madness is the beginning of a long-term slowdown. "The network space is one of the hot spaces," Biddle says. "It has nowhere to go but down."

The stock market volatility also may reduce the number of acquisitions, as it becomes more difficult for firms to use their stock to purchase others.

Abbe predicts network leaders such as Cisco, Nortel and Lucent will continue to acquire startups at an aggressive pace. But it may be harder for smaller, newly public companies to make acquisitions when their stock prices are fluctuating, he says. ◪



Panic and perspective

While last week's wild stock market ride made some investors nervous . . .

. . . the market as a whole is still up over 60% from a year ago.

SOURCES. BIGCHARTS COM

REACTION to the MICROSOFT RULING

"Consumers will be positively affected, assuming Microsoft receives stiff sanctions. Microsoft products only work well with other Microsoft products; this is bad technology. Regardless of who made the many products that make up our network, they must interact through open standards. Microsoft typically 'interprets' or 'enhances' these standards, breaking things and forcing people to adopt only their technology."

Chip DiComo, network manager, USA Hellmann Worldwide Logistics, Miami.

SUSAN GREENWOOD/MPG

"Microsoft's actions, while destructive to competitors, actually benefited consumers in the long run. As Microsoft's clout and dominance in the industry rose, software prices were pushed down and feature sets became more robust. The consumer stands to lose while the investor stands to profit if the company is broken up."

Stephen Lopez, manager of IT architecture, National Board of Medical Examiners, Philadelphia.

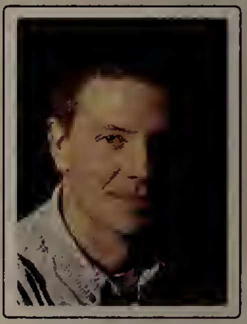
"It's a bad omen when the government can decide that it's illegal for a company to integrate its own products. The ruling against Microsoft will have neither a positive effect on the software development community nor on consumers, the group that should actually benefit from this ruling."

Tim Matthews, associate director of technology, University of Texas College of Business.

BOB DAEMMRICH/MPG

"I don't think it will affect my decisions for the rest of the year. The final phase of the three judicial phases and the almost certain appeals process means that anything substantial will be at least another year away. Additionally, any plans we have involve currently shipping products."

Brook Smith, network administrator, Forum Financial Group, Portland, Maine.



JIM DANIELS

Microsoft, continued from page 1

Poole, corporate network administrator for Agra Earth and Environmental, an environmental consulting company in Seattle. "Whatever happens in court will not influence the technology we deploy."

Poole, whose network includes Microsoft and Novell products, says only a breakup of Microsoft will bring an appropriate end to the case. "Break Microsoft into three or four clones and let them go at it," he says. "We'll get more stable systems with fewer bugs for less cost."

Lesser remedies are unlikely to have the desired impact, he says. "Have you ever read the Halloween Documents? Microsoft doesn't play fair," he says. These documents were confidential Microsoft memos on the threat of open source software and Linux that found their way onto the Internet in 1998.

But others say a breakup is too harsh a penalty.

"The ruling is correct, but maybe not good for end users. A breakup would end up costing us dollars," says Ronald Shoults, information technology secretary for The Salvation Army in Des Plaines, Ill. "It would be hard for everybody in IT. There need to be rules of conduct and monitoring. It's the only action that is prudent."

A central theme in the Department of Justice's case has been that Microsoft's tactics harmed consumers. But Shoults says he hasn't been hurt by Microsoft's actions.

"Where Microsoft has made it difficult is in getting equipment preloaded with our browser of choice, but now that is a nonissue," he says. "This case now seems to be about sending a message to Microsoft."

One industry analyst agrees that IT organizations are wise to take the ruling in stride.

"There is no reason to panic," says Michael Gartenberg, an analyst with Gartner Group in Stamford, Conn. "If you've been comfortable with Microsoft until now, you should continue to feel that way."

But comfort levels may be shifting for some customers.

"My big fear is that the attorneys are excited about problems that don't matter to us in IT," says Greg Scott, IS manager for Oregon State University College of Business. "They will kill the golden goose."

Scott says Microsoft delivers what he needs — an integrated package of operating system software and applications that give him 90% of his needed functionality out of the box, plus a set of development tools that let him customize the other 10%. "I'm afraid the DOJ will screw that up," he says.

He's not the only one. Thousands of users are deeply committed to the Microsoft product suite and would likely feel pressure if the company suffers harsh penalties.

"In a break-up scenario, the impact is almost always adversely felt by the user," says Rob Enderle, an analyst with Giga Information Group in Cambridge, Mass. "Prices go up, quality goes down and confusion rises as users wonder what vendor to choose."

Enderle says the good thing is that over the long term, those effects will dissipate. But some users worry about the long-term implications of government intervention in the IT industry.

"If the government does this to Microsoft, who will be next to come under scrutiny?" asks Chuck Yoke, manager of information systems for Tecomac, a software developer in Englewood, Colo. "Is it Cisco in networking, Lucent with the PBX?"

Additionally, Yoke thinks most of the issues in the case will be moot in three years.

"The number of applications you actually own will be small and you will rent, lease or use applications that live on the Internet," he predicts.

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THE BASICS OF THE RULING

What did Judge Jackson rule?

He ruled that Microsoft violated Sections 1 and 2 of the Sherman Antitrust Act through a series of exclusionary, anti-competitive and predatory acts. Jackson found that Microsoft illegally integrated Internet Explorer and the Windows operating system, a violation of Section 1. Jackson's "conclusions of law" went on to say Microsoft pressured OEMs, service providers and developers in a campaign to crush the growth of Netscape Navigator and the Java programming language. Jackson also said Microsoft tried to monopolize the Web browser market. Both, he said, were violations of Section 2 of the Sherman Act. He also found the company violated antitrust laws in the 19 states that were part of the suit.

Was there anything favorable to Microsoft?

Yes. Jackson said Microsoft's marketing deals with other vendors were not illegal exclusive deals as the government charged. He also found that Microsoft did not entirely cut off Netscape from distribution channels for its browser, a fact that opens a legal crack in Jackson's ruling that Microsoft engaged in anticompetitive behavior.

What is the next stage in the trial?

The penalty phase, which begins later this month and concludes May 24. The judge said the government must file its proposal for penalties by April 28 and Microsoft must file its response and its own proposals by May 10. The government will then respond to Microsoft's proposals by May 17.

What are the possible penalties?

The judge could impose a conduct remedy or a structural remedy. Given the pace Jackson has assigned to the penalty phase, a breakup of Microsoft, the structural option, may be less likely. A conduct remedy would focus on forcing Microsoft into uniform licensing practices and the opening up of source code and APIs.

What does this all mean for enterprise customers?

Little at this stage. The case could drag on for years. Users planning on rolling out Windows 2000, Exchange 2000 or any other BackOffice servers should keep an eye on the case, but in all likelihood they can continue their deployment plans with confidence.

Will Microsoft appeal?

Yes. But it will have to wait until after the penalty phase because the case is not final until then. Jackson said last week he will seek to expedite the appeal to the Supreme Court.

So is Microsoft off the hook until the case is settled?

Not necessarily. The government could push for preliminary restrictions during the appeals process.

— John Fontana

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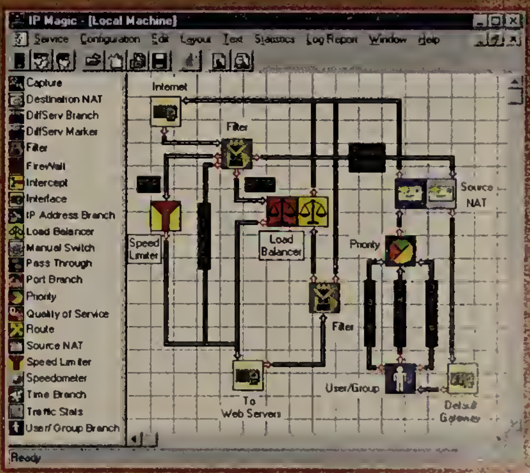

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Wireless Web,
Continued from page 1

When the pour is done, he'll push another button and the ready mix company he works for, Ozinga Chicago RMC, will be fed accurate data on how long the job took. That information will be combined with Global Positioning System (GPS) data on distance and time to the construction site for determining pricing and route planning.

Dispatchers can view this data for each truck, watch its route progress and schedule deliveries using a Web browser. Soon the drivers will be able to capture a construction foreman's signature on the Palm device and electronically trigger the billing process.

This all is, aptly enough, a concrete example of how companies are exploiting the "wireless Web" even as service providers flounder while trying to deliver more compelling wireless Internet services to consumers than last night's sports scores.

Corporations already have a lot of compelling information, much of it is now on the Web. A growing number of network executives are realizing that an array of existing wireless networks let them provide access to this data in new ways.

"Businesses are saying, 'We want to converse in real time with our business infrastructure,'" says David Oros, CEO of Aether Technologies, a wireless systems integrator. "With wireless technology, they can have real-time updates, not end-of-day or weekly updates, to corporate data."

Real-time data can be used to improve customer service, speed delivery times, cut billing cycles or trim inventories. "These are event-driven processes, and businesses need to react to these right away," Oros says.

Ozinga's dispatch application — dubbed RoadRunner and now offered to other delivery companies — was designed as a hosted Web service by TrackYourTruck.com, of Lemont, Ill. Why a hosted Web service? It's easy to roll out at customer sites and can save customers money, says TrackYourTruck.com President Robert Hall.

After a 90-minute demonstration, Ozinga's truck drivers, some of whom had never used a computer, were online.

The Palm device in each truck attaches to an Airlink Pinpoint CDPD radio modem, which transmits at 19.2K bit/sec via a cellular carrier such as Ameritech. The radio is, in effect, an IP device attached to the Internet. CDPD service is inexpensive and ideal for applications covering a relatively small area, Hall says.

Via message queuing middleware from Nettech Systems in Princeton, N.J., the Palm application accesses the TrackYourTruck Web site, where a Microsoft SQL Server 7.0 database stores the information. Dispatchers at Ozinga's main yard access the data and the GPS map from PC-based Web browsers.

Where TrackYourTruck uses a carrier service for wireless transport, Boeing is using a campus wireless LAN to connect handhelds with its pervasive internal Web (see graphic).

One example is a forms-based application running on PalmOS devices. Originally, the software was built to give PC support technicians a more accurate way to record the time they spent on each desktop visit, says Christopher Esposito, who was until recently associate technology fellow with Boeing's Advanced User Environments Group (since this interview, he has joined a new company).

BOEING'S WIRELESS TECH SUPPORT

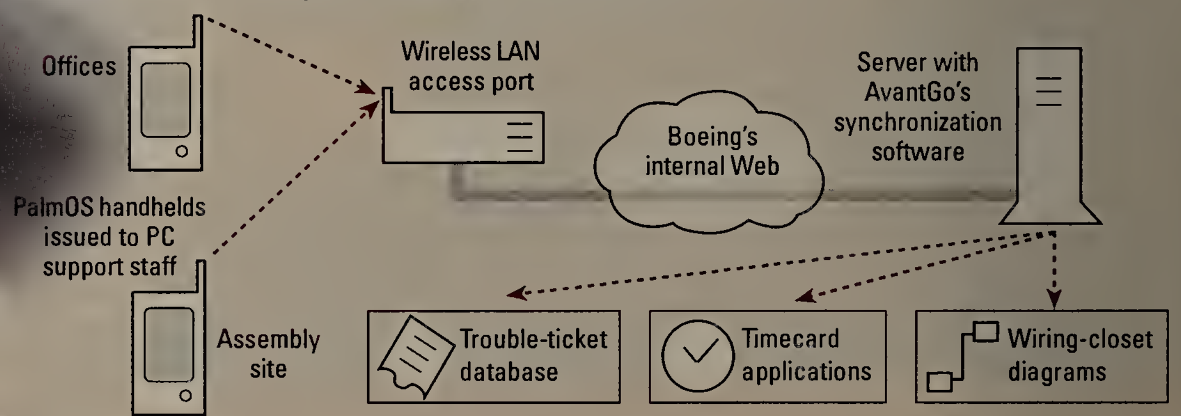
Inside a sprawling assembly plant at Boeing's Seattle headquarters, a support technician reboots a PC on which he has loaded a new set of drivers. Once done, he taps the screen of his Palm III to enter the job start and stop times on a forms-based timecard application. The data uploads via a wireless campus LAN to a Web server and synchronizes through AvantGo's Enterprise middleware with the back-end database. He downloads a trouble ticket for the next job, along with directions to the faulty PC. When he arrives, he wirelessly connects again to view a diagnostic flow chart, then skips to the specific documentation he needs. He can fire off an instant message query to other technicians online and get immediate recommendations.

Soon, the Boeing support technicians will be able to fill in a trouble ticket form on the Palm and update the database. That information will then be sifted through to identify chronic PC problems.

— John Cox

How it works

Boeing has linked PalmOS devices to data and applications on its internal Web through a wireless LAN. The AvantGo software, including a client with a Web browser, links with back-end servers and displays any HTML 3.2 information.



"Then, there were all these other things we began to come up with," he says. "We added diagrams of the network closet configurations, then contact information for instant messaging with the other technicians, and then access to the trouble tickets."

Making the most of content

"If you already have a big investment in your Web site and its content, then the question is: How do you take this content and repurpose it for wireless devices without having to create a whole separate infrastructure?" asks Andre Boysen, chief technology officer with 724 Solutions, a Toronto software and systems integrator.

The answer hinges on the purposes for which you want the information. In some cases, it's relatively simple to display subsets of database information on a handheld using simple forms, third-party middleware and low-bandwidth wireless connections.

But deployment can become complicated with complex applications, the need for higher bandwidth for more reliable connections and wide-area coverage. Securing data and access remain major issues, industry observers say.

For experts, installing internal wireless Web systems is getting easier, says Rick Burris, president of eSense, a Palm Desert, Calif., integrator that specializes in electronic purchasing systems. He devised an extranet-based purchasing system using application software from Varian to help Regent's Bank in Birmingham, Ala., centralize purchasing for 800 branches spread across seven states.

A teller or branch manager now uses a desktop browser to order deposit slips or ballpoint pens. The Varian software processes the order. Workers at Regent's sprawling new warehouse see the orders displayed on wireless Symbol handhelds fitted with barcode scanners. Shipments now take three days instead of five or more. Clerical errors have been almost eliminated, and Burris says the entire system cut $7 million per year from bank expenses.

"This was the fastest installation I've ever seen: 14 weeks from signing the contract to full operational status," Burris says. A traditional client/server deployment would have taken six to 18 months, he says.

"Your infrastructure is already in place if you've got a Web browser," he notes.

Development tools and system software for supporting complex wireless Web applications are only just now becoming available.

For example, 724 Solutions offers banks and financial ser-

PALM READERS
Gadgeteer, PDA Geek and Smaller.com are just a few of the online resources for Palm users. We've got links to these sites as well as Buyer's Guides to determine which handheld is best for you.
DocFinder 7630
find it online

Wireless mergers could bolster service offerings

Bell Atlantic and Vodafone Airtouch also promise better pricing and national calling plans.

BY DENISE PAPPALARDO

Two wireless service provider giants were born last week, but while one is already taking its first steps, the other is still in an incubator.

Bell Atlantic Mobile and Vodafone Airtouch formally united their wireless assets to form Verizon Wireless and announced plans to take advantage of their combined assets and reach.

The combined entity is now the largest wireless service provider in the U.S., with more than 16 million customers, and will add another 8.5 million when Bell Atlantic and GTE's planned merger goes through. Those companies will then go by the name Verizon.

Meanwhile, SBC Communications, formerly the largest wireless service provider, announced plans to merge its wireless business with that of BellSouth. This yet-to-be-named joint venture will be the second-largest wireless service provider in the U.S., with more than 16 million customers. AT&T Wireless and Sprint PCS trail, with 10 million and six million customers, respectively.

Verizon CEO Dennis Strigl says the company will offer nationwide services and pricing.

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While not all telecom megamergers pay off for customers, analysts say bigger wireless service providers are generally good for business and consumer users.

"Being able to get national calling plans that include all long-distance and roaming, which Verizon came out of the gate with, is good for users," says Elliot Hamilton, senior vice president at Strategis Group, a Washington, D.C., consulting firm.

Verizon Wireless president and CEO Dennis Strigl says the firm will spend $3 billion on network upgrades this year alone to support new two-way messaging services, faster data-transmission speeds and easy-to-understand nationwide pricing.

While Verizon Wireless' network assets are all based on the same technology — code division multiple access (CDMA) — the networks and billing systems still need to be integrated.

Verizon Wireless plans to start testing third-generation wireless technologies as early as June so that it can boost data speeds to 144K bit/sec. Today, wireless data speeds across Verizon Wireless' networks max out at 14.4K bit/sec.

The service provider is also pushing ahead with a nationwide two-way short messaging service that can support instant-messaging applications useful for traveling employees who need to communicate with co-workers at the office. Verizon Wireless is rolling out gear from Lucent and Nortel Networks to support the service, scheduled for availability by the end of September.

Verizon Wireless, which boasts a network covering 90% of the U.S., also aired a simplified national service plan called SingleRate. Users can choose from among five plans, including SingleRate 150, which features 150 minutes of service for $35 per month, and SingleRate 1500, which features 1,500 minutes of service for $150 per month.

IDC analyst Callie Pottorf points out that while the service rates are competitive with those of Sprint PCS and AT&T Wireless, SingleRate customers have to buy new dual-mode phones that cost about $200. Sprint PCS and AT&T Wireless are offering similar rates with phones that cost about $50 to $100.

As for the BellSouth and SBC venture, the service provider may have a harder time integrating its network than Verizon Wireless will.

BellSouth and SBC will likely standardize on Time Division Multiple Access (TDMA) and global system for mobile communications (GSM), but there is some CDMA in the service providers' network mix as well.

One other advantage CDMA offers over TDMA and GSM in the short term is easier upgrades, Hamilton says. Whereas CDMA can be upgraded via software, TDMA and GSM will require more involved hardware improvements.

BellSouth and SBC say they will emphasize wireless data services and upgrading to third-generation technology, but further details of their plans were unavailable.

BellSouth and SBC expect to announce the name of their venture once they get regulatory approval, which isn't expected for six months. ◪

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vices companies server programs and tools designed to let users of personal digital assistants and Web-enabled cell phones access a host of features, such as checking balances, transferring funds and paying bills.

The 724 Solutions software provides a secure interface, via the Web, between wireless handhelds and a bank or financial services firm's back-end systems.

Another company, start-up @hand, of Austin, Texas, released in March the @hand Mobile Application Environment. The products include an application-server program for hosting such services as data management, compression and links to back-end systems; a client for the mobile device; and a set of development tools, including a data modeler.

Even with such tools, designing corporate applications for display on very small, mainly text-oriented screens is an art, customers and developers say.

"Applications have to be rethought for the wireless space," 724 Solutions' Boysen says.

"Porting Windows' look and feel to a handheld device is generally a bad idea," Boeing's Esposito says.

> ■ **"Businesses are saying, 'We want to converse in real time with our business infrastructure.' "**
>
> David Oros, CEO,
> Aether Technologies

So wireless programs put a premium on simplified lists and explanations, the ability to choose quickly between options and minimizing data entry by hand.

Increasingly, developers are trying to feed "personalized" information to given wireless users. Based on their authenticated logons, users get selections of data and applications that relate specifically to the task in front of them — whether checking airplane wing tolerances or updating the software inventory on a malfunctioning router.

"If you can get data and computation and measuring right to the very spot in the field where it's needed, you have an enormous gain in productivity," Esposito says. "You're bringing the power of the corporate net to the exact point where it's needed, at the exact time it's needed."

Eventually, wireless data services from the carriers will make this possible across long distances.

"Sprint and AT&T are at the stage of creating wide-area wireless access for enterprise customers, giving them access to corporate intranets," says Marty Kacin, vice president of professional services for AvantGo of San Mateo, Calif. "A field worker will get secure access to a port in the corporate firewall. Things are about to get very interesting."

Wireless connections to the corporate Web are transforming the role of handheld devices.

"They're not just a tool to offload my e-mail so I can check messages during off hours," Esposito says. "In the space of a year or so, these will be more or less fully functional participants on the corporate net."

Think about that the next time you see a cement truck. ◪

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Backspin

Deals, compromises and pudding

In a recent column ("Scanning an Internet-style deal," *NW,* Feb. 28, page 130), I wrote about a discount I got on a scanner ($30 after rebates). In the following week's column, I related an even better deal a reader had found: after a competitive price match and rebates, he paid around $8 for the same device!

Want to hear an even better deal? Let me relate a story told to me by Randy Petersen, the CEO of Frequent Flyer Services and owner of the Web site WebFlyer.com. (Petersen is the country's leading authority on frequent traveler programs and he points out his company was built from air miles.)

MARK GIBBS

I was talking with Petersen about the world of air miles, and I asked what was the best frequent flier deal he'd ever come across. He told me about the "Pudding Guy," who gathered 1,215,000 frequent flier miles by purchasing chocolate pudding.

The Pudding Guy, aka David Phillips, purchased 12,150 cups of Healthy Choice chocolate pudding after learning of a promotion that gave him 100 miles for each cup of pudding. That meant that the cost of the miles was extremely cheap, so he bought all the pudding he could find.

He spent $3,140, donated most of the pudding to charity for a write-off and, after paying taxes, had laid out $2,325 or 0.0019 cents per air mile — that's an amazingly cheap rate. What a deal!

Of course, the Pudding Guy had to spend not only money to acquire his bounty, he also had to expend labor. He had his whole family peeling labels off tubs of pudding so he could mail in the coupons to get his miles, and he still has cupboards full of pudding. You always have to make compromises to get a great deal.

Now, a few weeks ago in the column "Overtightening Novell's nuts" (*NW,* March 13, page 90) I discussed how I had chosen to outsource my company's Internet servers. I said I would have liked to use NetWare, but since the outsourcing company I preferred only supported NT and Solaris, I was out of luck. I wound up using NT for my Web servers.

Well, the result of my compromise to use NT instead of NetWare kicked off a minor storm of criticism from readers suggesting that I had sold out and I should have stuck with NetWare and found another outsourcing partner. And those were just the polite comments.

In the face of such responses, I ought to clarify some issues: First (and this is something that I suspect none of the critics considered), there were other factors involved in the decision. For example, you don't just choose an outsourcer based on a single criteria such as operating system support. In my case, the depth and quality of the relationship and service is critical to achieving success.

Second, the framework in which the service exists is of huge importance — I require high-quality support and in-depth network management.

Third, since we are dealing with what could easily become one million users with a significant proportion on dial-up, the relationship with our ISP partner (a sister company to the outsourcer) meant that I wouldn't have a hole between hosting and access provision.

I could go on, but the fundamental issue is that any significant IT investment will always involve more factors than just which operating system is the best. What I wanted was to use the operating system I preferred, create the network environment I needed and have an in-depth service infrastructure. The trouble is I could only choose two out of the three.

So I had to make a compromise. I would have preferred not to, but that's the way it works when you build real systems. Best of all, I have gained development and implementation speed and, unlike the Pudding Guy, I don't have a house full of chocolate pudding as a downside.

Compromises and deals to nwcolumn@gibbs.com.

'NET BUZZ

The latest on the Internet/intranet industry

PAUL MCNAMARA

The coolest thing about Pac Bell Park is that a home run walloped over the right field wall can splash down directly into San Francisco Bay.

The second-coolest thing is that this brand-new home of the **San Francisco Giants** was built from the infield up with the Internet and every other manner of next-generation networking in mind. (Hey, even an Internet columnist has to have his priorities in order.)

"We wanted to make sure that our network in and out of the park was as bandwidth-intensive as we could anticipate now and into the future," says **Dennis Neroda,** a business development specialist for Pac Bell who for three years has helped oversee this network project.

This means installing more than 200 miles worth of fiber and copper cabling, multiple DS-3s — each the equivalent of 28 T-1 channels — and multiple DS-1s "with room for growth." There's an OC-12 set aside for high-bandwidth broadcast video such as HDTV; a smorgasbord of digital subscriber line (DSL), frame relay and ISDN; as well as exterior and interior antennas for wireless PCS services.

Planned amenities include an automatic teller machine that will spit out tickets ordered beforehand on a will-call basis and a Web-based marketplace for season-ticket holders to sell tickets for games they don't plan on attending. The park even has more than 80 pay phones with integrated data ports, meaning you could conceivably lug your laptop to a game and download e-mail during the seventh inning stretch. . . . Of course, someone might spill a beer on you in protest.

Because Pac Bell paid big bucks to put its name on this privately financed stadium, fans will get a chance to visit an area where "they can test drive our DSL," Neroda adds. (What child's first trip to a Major League ballpark would be complete without that?)

But cringe not, you baseball purists, as Neroda swears that no one involved has forgotten his or her core competency.

"It's a ballpark first and foremost," he says, "a place to play baseball."

Here's an interesting juxtaposition: Just as plummeting Internet stock prices had the professional doomsayers cackling their self-righteous "I told you sos" early last week, Technology Crossover Ventures (TCV) was announcing what it claims is the largest-ever capital fund targeted exclusively at Internet companies.

We're talking $1.6 billion in one fund from one venture capital outfit.

Backing the TCV fund are one hundred institutional investors, 15 banks and 150 high-tech executives.

Meanwhile, at the controls of that Nasdaq roller coaster are **Stuart** from the **Ameritrade** TV commercial and an army of skittish day-traders.

Personally, I'll worry about the future of the Internet economy when the venture capitalists turn tail and run. There's been no sign of that yet.

The top story in last Monday's *New York Times* painted a frightening picture of how the Internet's cloak of anonymity and stockpile of personal information have led to an increase in the crime of identity theft. Prominently featured in the story were a dozen California co-workers who had their Social Security numbers misappropriated by a con artist. All told, 75 credit cards were illegally acquired and $100,000 charged in the names of these unsuspecting victims.

And what network security hole did the bad guy exploit to filch those Social Security numbers?

None whatsoever. A few paragraphs from the end of a long article, we learn that the personnel records of our victims were simply grabbed from an unprotected storage closet.

Moral to the story: The Internet undoubtedly makes certain crimes easier — identity fraud being an example — but nothing will ever lend more of a hand to criminals than do the twin terrors of carelessness and stupidity.

Guard your personal information zealously, but feel free to send dirt about anyone else to buzz@nww.com.

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